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THE

NATURALIST:

A

MONTHLY JOURNAL OF

NATURAL HISTORY FOR THE NORTH OF ENGLAND

EDITED BY

THOS. SHEPPARD, M.Sc., F.G.S., F.R.G.S., F.S.A.(Scot.).

Curator of the Municipal Museums, Hull.

Hon. Member of the Yorkshire Naturalists' Union; the Spalding Gentlemen's Society; the Doncaster Scientific Society; the Selby Scientific Society.

AND

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WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

J. GILBERT BAKER, F.R.S., F.L.S. — GEORGE T. PORRITT, F.L.S., F.E.S.

Prof. PERCY F. KENDALL, M.Sc., F.G.S. — JOHN W. TAYLOR, M.Sc.

RILEY FORTUNE, F.Z.S.

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Boston Spa, Yorkshire.

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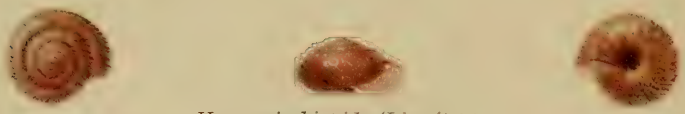

Hygromia hispida (Linné) × 2.
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H. hispida var. *fusca* (Moq.) × 2.
Grimsargh, Lancs., W. H. Heathcote.

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The Lizard, Cornwall, Miss F. M. Hele.

Hygromia fusca (Montagu) × 1½.
Bassenthwaite, Cumberland, Capt. W. J. Farrer.

Helicodonta obvoluta (Müller) × 1½.
Ditcham Wood, Hampshire, L. Dawes.

J. W. Taylor, del. ad nat.

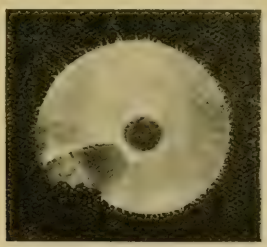
THE NATURALIST

FOR 1917.

NOTES AND COMMENTS.

TAYLOR'S MONOGRAPH OF MOLLUSCA.

Notwithstanding the depletion of his staff by voluntary and forcible enlistment, Mr. J. W. Taylor has brought out part 22 of his Monograph of the Land and Fresh-water Mollusca of the British Isles,* which apparently commences a new volume. He also hopes to issue a further instalment shortly. Part 22 deals with *Hygromia striolata*; *H. hispida*; *H. revelata*; *H. fusca*; and *H. obvoluta*. Each is dealt with under the various and familiar headings, and well illustrated, in Mr.



JUN 24 1917

Young shell of ***H. striolata*** × 5, Grange, Mr. F. Booth, showing the hispid epidermis (from photograph by Mr. W. Bagshaw).

Taylor's usual careful way; and with each species is given a photograph of some zoologist associated with the particular form. There are also the familiar distribution maps. There is a coloured plate showing the various species of *Hygromia* and *Helicodonta*, which is perfect. The only error we have noticed in the part is that Mr. T. Sheppard's record of the fossil form of *H. hispida* for Yorkshire, should be from Bielbecks, near Market Weighton. We are kindly permitted to reproduce one of the 93 illustrations in the text, as well as the coloured plate already referred to.

THE VASCULUM.

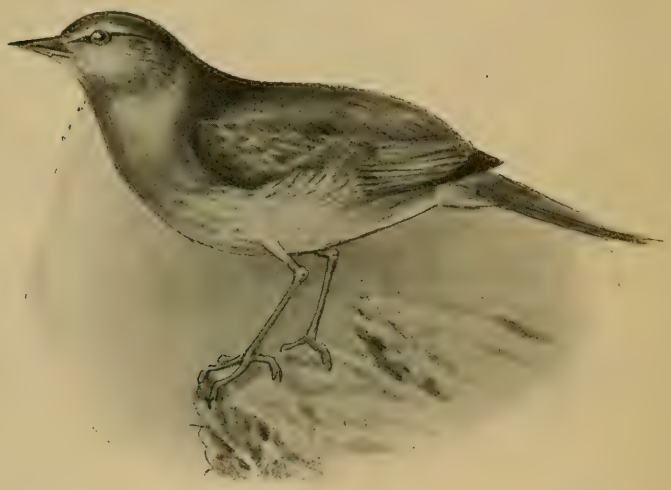
The Vasculum for November, is excellent. Mr. G. Bolam contributes two good papers on Birds, which contain valuable records and observations, including a note on a Little Bittern at Gateshead on July 27th. Mr. G. B. Walsh writes 'On the

* 64 pp., 5 plates, 7s. 6d. net.

Preparation of Insects as Microscopic Mounts.' Mr. A. Chapman records a Grey Shrike at Wark's-fell, on January 7th, 1916, and writes on 'Woodcock in Spring.' Mr. H. Preston gives 'First experiences with a Marine aquarium.' There are also the numerous and valuable 'Notes and Records,' most of which refer to V.C. 66 (Durham), though there are Yorkshire items. There are the usual minor misprints on the head-lines. In one case, the printer has failed to spell 'Vasculum' properly.

AN UNKNOWN WARBLER.

In the same journal, Mr. A. Chapman figures 'An unknown Warbler,' which he sketched, but was unable to shoot. It



disappeared while he was seeking a 'collecting gun.' We are kindly permitted to reproduce his sketch, made while the bird was on a rockery at Houxty, North Tyne, on September 23rd, 1913. 'In colour, its upper parts were chocolate-brown, ruddier on the rump, while below it was pale grey fading away to almost white. A dark band through the eye, with white superciliary streak above, were conspicuous features.' Possibly some of our readers may care to try to identify the species.

MANCHESTER MICROSCOPISTS.

The Annual Report and Transactions of the Manchester Microscopical Society for 1915,* includes the Presidential Address (with plates) on 'Graft Hybrids,' by Prof. F. E. Weiss; 'A sandy sea-shore,' by Joseph Kitchen; 'Yeast,'

* W. F. Jackson & Sons, The Manor Press, 71 pages, 1/6.

by W. Salmon ; 'The Life of the Honey Bee,' by Frederick H. Taylor ; 'Mounting in Fluids,' by Wm. Cookson ; 'The Preparation of the Knife for Section Cutting,' by Albert Newton ; 'The Preparation and Staining of Material for Mitosis,' by A. E. Openshaw. In addition are the usual reports of meetings and rambles. We as glad to find that this Society continues to issue its welcome reports, which keep up the well-known standard of excellence.

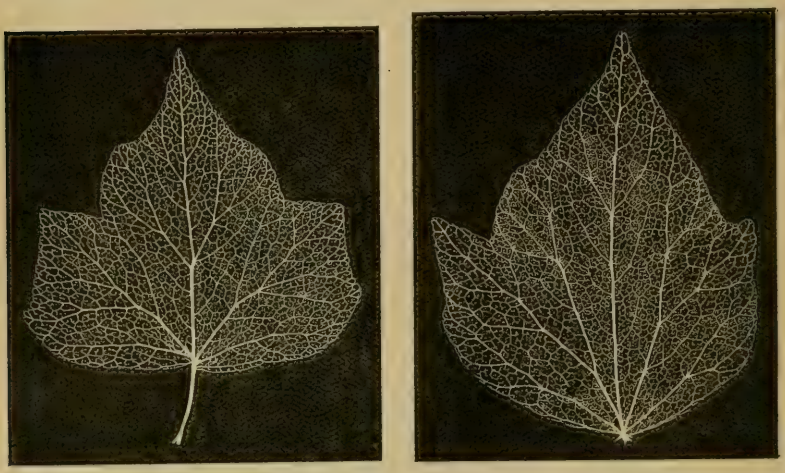
POPULAR LECTURES.

Mr. P. J. Ashton's paper on 'Popular Lectures,' read before the Conference of Delegates at the Newcastle Meeting of the British Association, is printed in *The Selborne Magazine* for November, and is worth the serious consideration of provincial societies. His conclusions are :—(1) The objects of the various societies should be carefully scrutinised to see whether any alterations in the rules are necessary in order to widen the scope of their activities. (2) A central Bureau for the supply of lecturers should be established in order that professional or other competent lecturers can be at the service of the Societies, regulating their visits in a manner which will compensate them for their services, and be within the financial scope of the Societies. (3) Where the funds of the Society will not permit of direct payment of fees, the difficulty of raising the necessary expenses can be overcome by dividing the meeting into two classes : (*a*) special members' evening for discussion of local or advanced topics ; (*b*) popular evenings to which a charge for admission could be made, and the public admitted. This method has been adopted with success in many Societies, including recently the Selborne Society. Our subscription (five shillings per annum) being manifestly inadequate to meet the expenses of professional lecturers and guides, the lectures and rambles have been subdivided, the members' excursions, under voluntary guidance, being continued side by side with a new series of public rambles and lectures under professional leadership.

LEAF SKELETONS.

Miss F. A. Gordon writes on 'Leaf Skeletons' in *The Selborne Magazine* for December. She says she prefers the method of using fresh water only. 'It is very slow, but the results are better, and patience is occasionally rewarded with a really perfect specimen, with every fibre quite unbroken. It is also possible to preserve skins. It is always easy to get one skin, the upper and strongest. To get both is difficult, but it is worth the trouble and care. This fresh-water method is quite wholesome, with no unpleasant and stagnant water. For the best results, gather well-developed leaves, put them in water at once, changing it every day for about two weeks,

then twice a week for a month, then once a week or less in cold weather; in from five to fifteen months, the specimens will ripen. Flat white porcelain dishes, used for photographic work, are very nice and useful. The necessary tools are a good small paint brush, a tiny piece of sponge, and an old knitting needle, but fingers must do most of the work. Keep



Skeleton Leaves of Ivy.

the specimen under water, supported on a piece of glass.' We are permitted to reproduce two of the illustrations.

THE PALÆONTOGRAPHICAL SOCIETY.

Notwithstanding many adverse circumstances the Palæontographical Society was able to issue its Report for 1915 before the close of 1916. It is occupied by two important memoirs. The first, by Dr. A. Smith Woodward, F.R.S., describes the Wealdon and Purbeck Fishes, and is illustrated by ten plates, besides numerous blocks in the text. Dr. Smith Woodward's unrivalled opportunities, together with his exceptional knowledge, make this memoir of especial importance. The second is Part II of Mr. W. K. Spencer's 'British Palæozoic Asterozoa' in which he deals with a very intricate and difficult branch of Palæontology. The specimens he describes and figures are principally from the Upper Ordovician and Upper Silurian.

PROTECTIVE SHELL-BANDING

In *The Naturalist* for 1909 the Rev. E. A. Woodruffe-Peacock stated that around Brigg the shells occurring most commonly at thrush anvils were unbanded, while shells with

one band came next in order, although these varieties were not the most abundant in the neighbourhood. This study has been continued by Mr. A. E. Trueman, B.Sc., in *The Annals and Magazine of Natural History* for October, 1916. He states :—

AND NATURAL SELECTION.

"Striking confirmation of Mr. Woodruffe-Peacock's observations on the localization of the different varieties was obtained while making this collection ; thus in the lane near Broxtowe for a distance of 50 yards quite four-fifths of the shells found had one band only. The complete details of the collections were as follows :—

	Standard Collection.	"Anvil" Collection.
Unbanded	25 per cent.	38 per cent.
1 band	16 ,,	23 ,,
2 ,, ...	2 ,,	2 ,,
3 ,, ...	5 ,,	6 ,,
4 ,, ...	9 ,,	8 ,,
5 ,, ...	42 ,,	23 ,,
6 ,, less than	1 ,,	..

Thus, although fully two-fifths of the standard collection had the normal five bands, little more than half this proportion of the broken shells were so marked. Further, although unbanded shells constituted only a quarter of the standard collection, they occurred in greater numbers among the broken shells. The chances of an unbanded shell being observed are, according to these figures, about three times as great as of a normal shell. Stated more concisely, in the standard collection, there was an average of 2·9 bands per shell ; among the broken shells the average was much lower, viz., 1·9 per shell."

EARLY MAN.

Mr. J. Reid Moir writes :—"It is pleasing to a prehistorian to notice the amount of space devoted in the November number of *The Naturalist* to the subject of early man. It is also of interest to me that two of my latest papers have been mentioned by the writer of your 'Notes and Comments.' But I fail to understand why on page 339 he states, in reference to my paper in the *Journal of the Anthropological Institute*, that 'we are not quite sure of the object of the contribution.' On page 338 he quotes the title of the paper in full, 'On the evolution of the earliest palæoliths from the rostrocarinate implements,' and this title seems clear and incapable of misunderstanding. But if your reviewer was unable to grasp its meaning, a careful perusal of the paper itself would have dispelled his doubts. Can it be that he has not read the paper through ? If he has not, it would seem that he ought not to criticise it."

A REPLY.

But we did read Mr. J. Reid Moir's paper and have read it again. We have read dozens of Mr. J. Reid Moir's notes in various and numerous publications, and we are still, in many cases, unable to understand his object in writing them, as very often the same statement occurs time after time in different journals. From the quantity of his notes, we have almost got the impression that possibly their publication was to advertise Mr. J. Reid Moir. Possibly we are wrong. But we leave our readers to read the paragraph headed 'Pointed Palæoliths' on page 339 of our journal. The paragraph is Mr. J. Reid Moir's, not ours. And if they can then see what his object is, we are satisfied.

MAN AND MR. MOIR.

Mr. J. Reid Moir continues :—"Then again, on page 341, where your reviewer criticises my note which appeared in last month's issue of *Man*, it seems that an attempt has been made to fog the issue. In this note I made it quite clear that Mr. Warren, whose paper I was criticising, stated that he could not imitate the flaking upon the sub-crag flints, because it was not possible to use such an amount of pressure experimentally. This, as I demonstrated, is incorrect, as I have seen flints flaked by pressure in a press which showed flake-scars quite as large as those exhibited by the sub-crag specimens. I stated also that I have proved by experiments, which your reviewer can easily repeat if he wishes to do so, that no flint will stand any very great pressure without suffering disintegration. This being so, it follows that those specimens in the boulder clays which are striated, are those to which this maximum pressure has not been applied. The other specimens which were subjected to the maximum were, no doubt, ground up and have disappeared. And this would inevitably be the fate of any flint subjected to the amount of pressure which Mr. Warren had in mind and which he said he could not imitate experimentally, and which 'obtains beneath an ice-sheet.'"

FLINTS UNDER ICE-SHEETS.

Basing his remarks on his experiments, Mr. J. Reid Moir distinctly states in *Man*, page 156, that "Flint of even the best quality and greatest hardness will stand only a limited amount of pressure before fracturing, and the pressures 'that obtain beneath an ice-sheet' would undoubtedly reduce it to powder." Now as there are tons upon tons of flints of all sizes in boulder clay, a deposit undoubtedly formed beneath an ice-sheet, we must conclude either that the ice-sheet has acted in an improper way and contrary to Mr. J. Reid Moir's laws, or that Mr. J. Reid Moir's experiments are not reliable. Personally, we should put our money on the ice-sheet.

A PREHISTORIAN'S GEOLOGY.

Mr. J. Reid Moir goes on to say:—"I am quite familiar with striated flints in boulder clay, and have described their nature and characteristics with some care and detail (see 'The Striation of Flint Surfaces,' *Man*, Vol. XIV, No.. 11, November, 1914). It appears to me that it would have been almost as well if your reviewer had made himself acquainted with this fact before accusing me of a lack of 'an elementary knowledge of geology.' It may even be that my knowledge of the constituents of boulder-clay surpasses his own. But in any case, I feel justified in asking that in future your reviewer may take the trouble to possess himself of at least an elementary knowledge of my work before essaying to criticise it in a public journal."

ARCHÆOLOGY AND GEOLOGY.

As already stated, we have read, marked, and tried to digest Mr. J. Reid Moir's numerous epistles, and we know all he has written in *Man*, and while we did not necessarily imply that the cap would fit him, we still maintain that anyone trying to prove that any human bones or wrought implements are of extraordinarily great age, the person attempting to do so should have at least an elementary knowledge of geology. We do not for one moment wish to compare our knowledge of glacial beds with that of Mr. J. Reid Moir. Judging from his writings, his knowledge in that direction is unique. We know no geologist who would vie with him. Mr. J. Reid Moir once certainly did publish some of his observations on boulder clay. Let us see what happened.

THE IPSWICH SKELETON.

In the *Proceedings of the Prehistoric Society of East Anglia*, Vol. I., part 2, Mr. J. Reid Moir contributed a paper on 'The occurrence of a Human Skeleton in a Glacial Deposit at Ipswich.' Together with 'expert' opinions, it occupied sixteen pages, and three plates, and is illustrated by photographs, drawings, sections, etc; altogether an elaborate business. One of the plates shows Mr. J. Reid Moir with his 'left arm' resting on a 'block of clay.' And it's a very good photograph too. His paper includes a report signed by himself and three other local prehistorians. This contains the following:—

A SIGNED REPORT.

'We, the undersigned, were present at, and superintended, the digging out of the human remains found at Messrs. Bolton and Laughlin's pit, Ipswich, on Saturday, October 7th, 1911. *We all most carefully examined* the section of decalcified boulder clay, under which the bones lay, before any digging commenced, and were absolutely convinced that no grave had ever been dug on the spot before. This opinion was confirmed (1) By

the extreme hardness of the boulder clay, which necessitated the continued use of picks in getting it up. (2). There was not the slightest sign of any mixing of the soils (such as would occur in an old grave), the boulder clay resting normally on the underlying glacial sand as it does in all sections known to us where the succession of the beds is the same.'

THE GEOLOGICAL EVIDENCE.

And now we come to Mr. J. Reid Moir's geological work. He says "Let us suppose that this man, whose remains we have found, was wandering over the sandy land surface, and was overcome with the cold. If this were the case he would lie down, curl himself up for warmth, and eventually get covered by the sand as it was blown by the wind. This supposition is borne out by the fact of the contracted position in which the body was found, and also as the climate was fast degenerating into glacial conditions, it is certain very low temperatures were present. There also seems no doubt that when the boulder clay was first deposited, there was a very much greater thickness of it than is seen now. The melting of the ice-sheet which laid it down would cause a lot of denudation, and during the ages which have been passed since the ice finally disappeared the same process has been continually going on." . . . .

HOW THE YOUNG MAN DIED.

"Now if this man was lying on this glacial sand, and was covered by the boulder clay, we can be sure that as the clay became decalcified, the human bones would also disappear by the same process. This is exactly what happened. The skeleton was found lying partly embedded in glacial sand and partly in boulder clay. The glacial sand underlying the clay in both sections is highly calcareous. *This condition could not possibly be present if at any time the clay had been denuded and re-deposited*, because the water which would accompany any such phenomena would dissolve out the chalk from the underlying sand. There can, I think, be no doubt that the material under which the bones were lying *is the undisturbed*, though eroded and partly decalcified, *base of the chalky boulder clay formation*."

EXPERT REPORTS.

One well-known geologist, a Fellow of the Royal Society, thinks there is no doubt that the pit shows a 'junction section of the boulder clay with the underlying sand and gravel, but he fails 'to understand how man could have lived at the time of the commencement of the Boulder Clay.' Another geologist, a Professor, guardedly states that he is 'unable to distinguish a thin mass of such a clay from true boulder clay.' Dr. Arthur Keith, whose work among the bones of early man is well known to our readers, also gives a report, in which he says, 'If Mr.

Moir and I are right in assigning the remains here described to a man who lived in Suffolk before the formation of the boulder clay, then there can be no doubt we are dealing with one of the earliest representations of man yet discovered. The only other remains which are certainly older are the Heidelberg jaw and the fossil man of Java (*Pithecanthropus erectus*).' And Mr. J. Reid Moir concludes by stating that 'It will, I think, be seen from *these carefully-compiled reports* that in all respects this matter has been gone into in *as thorough and scientific a manner as possible.*' He also gives a photograph of a tusk of *Elephas* at Charsfield, which, in his opinion, was found on the *same horizon*, and suggests that the Ipswich man and the Charsfield elephant were contemporary. That was all five short years ago.

THE YOUNG MAN OF IPSWICH.

And now, after the elaborate and illustrated and signed reports, we get a reverse, which comes as a thunderbolt. This geological "prehistorian," with his expert knowledge of boulder clay, beats a retreat, regardless of the former assistance of his allies. As has been pointed out in *The Naturalist* on more than one occasion, the extraordinarily great age of the so-called Ipswich man was very doubtful, notwithstanding the lengthy reports on the subject prepared by Ipswich antiquaries, backed up by specialists who ought to have known better. We hope those specialists share our feelings at seeing the following admission which has been sent to the press by Mr. Reid Moir. The pity is that the original announcement was ever made, as the Ipswich skeleton, endowed with questionable years, has found its way into more than one text-book.

BOULDER CLAY AND NOT BOULDER CLAY.

Mr. J. Reid Moir writes:—"It will no doubt be remembered that at the time of the discovery, in 1911, of a human skeleton in a sand pit in the occupation of Messrs. A. Bolton & Co., Ltd. (late Bolton & Laughlin), of Henley Road, Ipswich, it was held by some geologists, and by myself, that the remains occurred beneath an undisturbed stratum of weathered chalky boulder clay. Since this discovery I have been enabled to investigate the small valley adjoining the sand pit in which the human skeleton was found, and to conduct excavations in the immediate vicinity of the spot where the bones occurred. These investigations have shown that at about the level at which the skeleton rested, the scanty remains of a 'floor' are present, and that the few associated flint implements appear to be the same as others found on an old occupation-level in the adjacent valley. This occupation-level is, in all probability, referable to the early Aurignac period, and it appears that the person whose remains were discovered *was*

buried in this old land surface. The material which has since covered the ancient 'floor' *may be regarded as a sludge, formed largely of re-made boulder clay*, and that its disposition was probably associated with a period of low temperature occurring in post-chalky boulder clay times It appears then, that the human skeleton found is referable to a late Palæolithic epoch, and *cannot claim a pre-chalky boulder clay antiquity*. I wish to take this opportunity to state that those who opposed my contention as to the great age of these remains were in the right, while the views held by me regarding them have been shown to be erroneous." As *The Naturalist*, from the first, opposed Mr. J. Reid Moir's contention, we can fairly assert that, on his own showing, *The Naturalist* is right, and Mr. J. Reid Moir is wrong.

GENITALIA OF ORNIX.

At a recent meeting of the Lancashire and Cheshire Entomological Society, Mr. F. N. Pierce read 'Notes on the Genus Ornix,' in which he reviewed the synonymy of the genus and mentioned having recently examined the types of the various species, with the assistance of Mr. Hartley Durrant, at the British Museum. Mr. Pierce alluded to the difficulty of identifying captured specimens by the wing-markings, and told how a little practice enabled one to correctly name any of the genus by an examination of the genitalia, and described how this could be done with certainty, without damaging the insect for cabinet purposes. The author exhibited all the British species of *Ornix*, including the species, which as the result of his investigation, he had introduced to the British List, viz.—*Ornix finitimella*, already known to occur on the Continent.

A HALIFAX INDUSTRY.

We learn from *The Yorkshire Observer*, that Halifax holds two world 'records'—the largest carpet works in the world and the largest building society. It is not so well known that Halifax also holds a record at the other end of the scale of business. This is in respect to the making of rings for canaries and poultry. By his own efforts, Mr. S. Drake, of Haley Hill, himself a keen fancier, makes as many as from five to ten million rings in normal times, but since the war, the difficulty of obtaining aluminium has caused a reduction of output. It is a one-man business, and that makes it the more notable. Mr. Drake manufactures for the Bird Emigration Inquiry Department of Aberdeen University, and one of their orders was for rings to be used for the marking of golden eagles. These were made of hard-drawn copper, which the birds were unable to bite through.

ON THE OCCURRENCE OF MANGANESE IN LAND AND FRESH WATER MOLLUSCA.

Prof. A. E. BOYCOTT, M.D., F.R.S., etc.

The present investigation originated in the observations of H. C. Bradley[1] on the occurrence of considerable quantities of manganese in fresh-water mussels in North America. Examining hundreds of specimens of *Anodon* and *Unio* from many different localities (the species are not particularised), he constantly found manganese to the extent of about 1 per cent. of the dry weight of the animal; the shell contained about 0·15 per cent., mostly in the nacre[2]; a manganiferous *Crenothrix* formed an important food of the mussels, and he suggests that the occurrence of this *Crenothrix* (and possibly other organisms which accumulate manganese) may determine the distribution of the molluscs. His observations are of much interest, especially as throwing light on the natural foods of mollusca (a matter on which there is little accurate knowledge), and indicating lines which may explain some of those curiosities of distribution and habitat which are familiar to field naturalists.

Following these indications, I have briefly explored such of our British land and fresh-water mollusca as I have been able to obtain, or which I happened to have by me, fifty-six in number. The results seem interesting enough to put forward in their present incomplete state in the hope that others will pursue the matter and help to clear up many points at present in doubt. The bodies alone have been investigated, and I know nothing of the occurrence of manganese in the shells.

The method of analysis is that indicated by Bradley and Bertrand.[3] The tissue, dried at 100°C., is burned, fused with potassium nitrate (the presence or intensity of green giving a good idea of quantity of manganese), dissolved in dilute nitric acid, strong nitric acid and solid potassium persulphate added, boiled with silver nitrate as a catalyser and the resultant permanganate estimated colorimetrically against known solutions. The method is admittedly of no very high order of precision, but it is quite accurate enough for the present purpose, and for a preliminary survey its simplicity makes it eminently suitable. In my hands 0·01 mg. manganese gives an obvious reaction and 0·005 mg. is detectable; it is inconvenient to have more than 2 or 3 milligrammes present.

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[1] *Jour. Biological Chemistry*, Vol. III. (1907), p. 151; Vol. VIII. (1910), p. 237.

[2] E. M. Nance (*Science Gossip*, n.s. Vol. IV. (1898), p. 343), showed that the pink colour of the nacre of some specimens of *Unio pictorum* was probably due to manganese.

[3] *Journ. Biol. Chem.*, Vol. VIII. (1910), p. 237; H. P. Smith, *Chemical News*, Vol. XC. (1904), p. 237; G. Bertrand and P. Thomas, *Guide pour les manipulations de chimie biologique*, ed. 2, 1913, pp. 16, 31.

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The results are expressed below as parts of manganese per ten thousand parts of dried snail body. Owing to the small amount of material available,[1] accurate measures in the case of species poor in manganese have not always been achieved, and with the smaller species ' trace ' signifies something less, and generally much less, than 1 part. At present, however, all I seek to show is that some species have very much less than others, leaving the precise amount for future enquiry.

In the following systematic catalogue of the results I have noted the localities and some data as to habitats which may be germane. Many are local specimens from the neighbourhood of Aldenham in South Hertfordshire.

GASTROPODA PULMONATA.

Testacella maugii. Hereford (garden) 1·5.

Limax maximus. v. *concolor,* Aldenham (garden) young 5, 23 adult 6, 12 ; Hampden, Bucks (beech wood) 56 ; v. *fasciata* St. Albans (garden) 9 ; Aldenham (hedge-bank) 2. Mean 16.

L. cinereoniger. Hampden (beech wood) 86.

L. flavus. St. Albans (garden, hole in lime tree) 1·3.

L. arborum. Hampden (beech wood) 270.

Agriolimax agrestis. Aldenham, five loci (fields and hedge-banks) 5, 6, 6, 6, 8 ; beechwood 13 ; St. Albans (garden) 14 ; Holmer, Hereford (garden) 2. Mean 9.

Milax sowerbyi. All from gardens ; Aldenham 3, 8 ; St. Albans 2 ; Hereford 13 ; Holmer 3. Mean 7.

Vitrina pellucida. Aldenham, three loci, less than 2. 1, 3. Mean 2.

Hyalinia lucida. Portmadoc, Carnarvon (1913) 23 ; (1914) 7. Mean 15.

H. cellaria. Ludlow, Shropshire 16 ; Castleton, Derby 25 ; Tremadoc, Carnarvon 71 ; Compstall, Cheshire 23 ; Symond's Yat, Gloucester 25 ; Barton, Lancashire 7 ; Aldenham, six loci 3, 4, 7, 17, 24, 34 ; Long Lane, Middlesex 27. Mean 22.

H. helvetica. Bicknor, Gloucester (1913) 14 ; ditto (1915) 35 ; Marple, Cheshire 69 ; Tremadoc 49 ; Aldenham, seven loci, 6, 10, 13, 16, 23, 24, 26. Mean 26.

H. alliaria. (*a*) from trees in beech woods, Hampden, Bucks. 99 ; Cranham, Gloucester 6 ; (*b*) woodlands, Credenhill, Hereford 62 ; Miller's Dale, Derby 3 ; Romiley, Cheshire 71 ; Aldenham 11 ; (*c*) mossy stone wall, Portmadoc, Carnarvon 43 ; (*d*) ruins under stones, Ludlow 1.4 Mean 39.

H. nitidula. Marple 85 ; Tremadoc 73 ; Ludlow 22 ; Castleton 17 ; Chepstow, Monmouth 6 ; Barton, Lancashire 8 ; Aldenham, three loci 2, 9, 20. Mean, 27.

[1] Many species are inconveniently small: about 80 dried bodies of *Hy. nitidula* go to a gramme, about 30 *H. rufescens* and some 400 *Ancylus fluviatilis.*

Zonitoides nitidus. Aldenham 10.

Z. excavatus. Portmadoc, Carnarvon (top of old stone wall, among dead leaves) 127 ; Romiley, Cheshire (under stones in wood) 185. Mean 156.

Arion ater. Aldenham (roadside) *ater* 4·4, 1·3 ; *albus* 1·0, 1·4 ; Monk's Risborough, Bucks (roadside) *ater* 1·0 ; Hampden, Bucks. (fungi in beech wood) *reticulata* 47. Mean, 9 or (excluding the high figure), 2.

A. subfuscus. Hampden (beech trees) *cinereofusca* 274.

A. hortensis. From gardens :—Aldenham 4, 5 ; St. Albans 8 ; Hereford 12 ; Holmer 6 ; field :—Aldenham 3. Mean 6.

Helicella virgata. Thurlestone, Devon 0·7.

H. itala. Aldbury, Herts 0.4.

H. caperata. Aldenham (off beech trees in wood) 0·5 ; Monk's Risborough, Bucks. (grass) trace ; Prestatyn, Flint (grass) 0·7. Mean 0·5 ca.

H. gigaxii. Aldenham (grass) 0·8 ; Prestatyn (grass) 0·8. Mean 0·8.

Cochlicella barbara. Thurlestone, Devon, trace.

Theba cantiana. Aldenham, five loci 0·4, 0·7, 0·9, 1·0, 1·1 ; Hereford, trace ; Monk's Risborough 1·0. Mean 0·8 ca.

T. cartusiana. Lewes 2.

Hygromia granulata. Long Lane, Middlesex 2.

H. hispida. Aldenham, three loci, trace, trace, nil ; Ludlow 0·7. Mean 0·3 ca.

H. rufescens. (*a*) gardens, Hereford nil ; Andoversford, Gloucester 0·3 ; Aldenham 0·2 ; (*b*) roadsides, Portmadoc, trace ; Brock, Lancs. nil ; Doward, Hereford 0·4 ; (*c*) beech woods, Hampden 0·6 ; Cranham, nil. Mean 0·2 ca.

Helicodonta obvoluta. Ditcham, Hants., nil (less than 0·9).

Helicigona lapicida. Symond's Yat, Gloucester (1913) 6 ; ditto. (1915) 12 ; Monk's Risborough, Bucks., trace ; Cranham, Gloucester, trace. Mean 5 ca. (?).

Arianta arbustorum. Aldenham, trace 0·3 ; Miller's Dale, Derby 0·3 ; Symond's Yat, Gloucester 1·3. Mean, 0·6 ca.

Helix aspersa. Aldenham, three garden loci 0·4, 1.5, 1·6 ; Miller's Dale (wild) 1·7 ; Hereford (garden) 0·9 ; Birmingham 0·7. Mean 1.

H. pomatia. Banstead, Surrey 2·5.

H. nemoralis. (*a*) roadside banks, Aldenham, three loci 0·2, 0·4, 1·8 ; Hereford, two loci, 1·1, 1·2 ; (*b*) beech wood, Cranham 0·7 ; vars. *rubella, libellula* and *castanea* examined. Mean 1.

H. hortensis. Roadside banks, Aldenham, three loci v. *lutea* 0·5, 0·3 ; v. *incarnata,* trace, 0·3, 0·3 ; v. *fasciata* 0·8 ; Hereford, v. *lutea* 1·2 ; v. *fasciata* 1.6. Mean 0·6.

Ena montana. Beech woods, Hampden, Bucks. 103 ; Cranham, Gloucester 77. Mean 90.

E. obscura. Beech woods, Hampden 85; Cranham 75; hedge-bank, Aldenham, 81. Mean 80.
Clausilia laminata. Monk's Risborough, Bucks. (beech wood) 6; Aldenham (hedge-bank) 10. Mean 8.
Succinea putris. Doward, Hereford 6.
S. elegans. Hereford 3; Long Lane, Middlesex 3. Mean 3.
Ancylus fluviatilis. Aldenham 21.
Limnæa auricularia. Aldenham, two loci, 2, 3.
L. peregra. Aldenham (*a*) ponds, nine loci, 1, 2, 2, 3, 3, 4, 5, 7, 10; (*b*) streams:—five loci 2, 3, 4, 4, 4. Mean 4.
L. palustris. Aldenham (*a*) ponds, three loci 2, 2, 3; (*b*) river, trace. Mean 2 ca.
L. stagnalis. Aldenham (*a*) ponds, eleven loci, 1, 1, 2, 2, 4, 5, 5, 5, 6, 9, 29; (*b*) river 2; Alderley Edge, Cheshire 6. Mean 6, or (without exceptional case) 4.
Planorbis corneus. Aldenham 2; Hereford 18. Mean 10.
Pl. complanatus. Aldenham, three loci (ponds), 2, 3, 4. Mean 3.
Physa fontinalis. Aldenham, two loci (streams), 3. 8. Mean 6.
Ph. hypnorum. Aldenham, trace.

GASTROPODA PROSOBRANCHIA.

Bithinia tentaculata. Aldenham, two loci 0·8, 1·1. Mean 1.
Pomatias elegans. Aldenham 1·2, 1·1; Monk's Risborough, trace. Mean 0·8 ca.

PELECYPODA.

Unio pictorum. Aldenham (lake) shell, 37 mm., 27; 45 mm., 36; 75 mm., 19. Mean 27.
Anodonta. Aldenham (lake) shell, 65 mm., 24; 100 mm., 34; 120 mm., 113; Barton (Canal), Lancs., 80 mm., 27; Birmingham 110 mm., 56, 96; locality unknown 35 mm., 24. Mean 53.
Sphærium corneum. Aldenham, four loci (three ponds, one river) nil.
Sph. lacustre. Aldenham, four loci (ponds) nil, nil, nil, trace.
Pisidium amnicum. Aldenham, nil.

Putting these results together, it is evident that the species examined fall into several groups as regards their content in manganese.

(*a*) Taking first the *land snails*, the helicids show little, ranging from *obvoluta, barbara, hispida, rufescens* with hardly any to *nemoralis, aspersa, granulata* and *pomatia*, which show up to 2 parts per ten thousand: the position of *lapicida* is uncertain, specimens from two loci in the Forest of Dean showing as much as 6 and 12, while others from the Cotswolds and Chilterns gave only a trace. The Zonitidæ, on the other hand, give uniformly high figures, which are the more reliable, as specimens have been examined from a wider range of

localities. *Nitidus* and *lucida* are the lowest, while *excavatus* showed 127 parts from Carnarvon and as much as 185 (1·85 per cent.) from Cheshire. *Buliminus montanus* and *obscurus* both give very high figures. while *Clausilia laminata* and *Succinea* have a moderate amount, and *Cyclostoma* only a little. Among the *slugs, Testacella* has least, *ater, hortensis, sowerbyi* and *agrestis* a fair quantity, *maximus* a large amount, while *cinereoniger, arborum* and *subfuscus* give very high figures. The last three species are, however, represented from a single locality only, and the figures are therefore unreliable. For this reason it is not possible at present to draw any distinction between the Arionidæ and the Limacidæ. *Vitrina* has only a little, something about 2.

(*b*) Among the *water snails, Ancylus fluviatilis* gives far the highest amount (21), and *Bithinia* and *Physa hypnorum* very little. *Planorbis* and *Limnæa* all show a moderate quantity, *Pl. corneus* the most, with a large difference for the two localities examined. The general position for the water snails is that they have more than the Helicidæ and less than the Zonitidæ.

(*c*) The *bivalves* fall into two very distinct groups—(1) those with much (*Anodonta, Unio*) and (2) those with little or none (*Sphærium* and *Pisidium*). *A. cygnea*, for example, may have 1 per cent. and *Sph. corneum* may give a negative reaction with as much as 0·8 gramme, *i.e.* something less than 6 per million.

I have made only a few casual observations on the distribution of manganese within the body.[1] If the carcase is roughly divided into (*a*) the head, neck, foot, with the lower part of the genitalia ; (*c*) the apical part, consisting of liver, intestine and hermaphrodite gland and (*b*) the rest, we find most in the liver and least in the head. Thus, in a series of *stagnalis* :

	Parts Manganese per 10,000.			
	(*a*) heads.	(*b*) middles.	(*c*) tails.	whole.
Shells 18 mm. long .. faint	trace (< 0·6)	9	16	8
,, 30 ,, ..	trace (< 0·3)	7	13	6
,, 40 ,, ..	trace (< 0·3)	6	19	7

The liquid obtained by gently crushing others of the same lot yielded none, which suggests that there is no manganese in the blood. The same preponderance in the liver was found in *nemoralis* (3·1 against 1·8 for the whole body), *cantiana* (3·0, 1·1 and 3·4, 0·7), *aspersa* (3·1, 0·9 and 1·8, 0·7), *pomatia* (4·5, 2·5), *helvetica* (63, 49), *lucida* (13, 7), *lapicida* (22, 12), but not in *Arion ater*, where the distribution was pretty uniform all through the bodies of two specimens, nor in *Limax maximus*, one of which (v. *fasciata*) gave a uniform distribution, while

[1] In mussels, Bradley (*loc. cit.*) found it in all organs, but mostly in the liver and mantle.

another (v. *concolor*) most of the manganese was in the skin (skin 16, liver 1·8, rest 1·5).[1]

The significance of these data cannot be fully determined without a good deal of further observation. It is, I think, pretty clear that a certain quantum of manganese is not a fixed and necessary constituent of the body for each species of snail. The different results from the same species are too variable for this. Thus, of the *stagnalis* from thirteen different loci, eleven fall between 1 and 6, one gives 9 and one the unusual figure of 29; in *peregra* from fourteen loci the variation is less, from 1 to 10, but is still considerable; among eight lots of *alliaria* the highest is 99, the lowest 3; in twelve batches of *cellaria* the range is from 3 to 71, and so on. In specimens from the same locus the variability is much less; thus, twenty-five specimens of *Arion hortensis* collected in one place at the same time were analysed in five lots of five each and gave 8, 11, 12, 12, 16; five lots of *sowerbyi* similarly treated, 11, 12, 14, 14, 14. It seems unlikely, therefore, that the manganese in these snails is in combination in the blood as a respiratory proteid such as the hæmoglobin described by A. B. Griffiths[2] in *Pinna squamosa* in which manganese was found in quantity by Krukenberg long ago.[3] If this were its office, one would certainly expect the quantity to be more uniform. On the other hand, the differences between different species are too large and too regular to be due to 'accident.' If one compares, for example, the Zonitidæ with the Helicidæ, there can be little doubt that it is definitely characteristic of the former to have more manganese than the latter; of 45 analyses of Zonitidæ, one falls as low as 2, and in 38 of Helicidæ only one rises as high. Similarly *Anodonta* evidently has much; *Sphærium* little or none.

It is an obvious suggestion that the differences found depend upon differences in food, the intra-specific variation being due to casual vagaries of eating, the inter-specific differences to more regular dietetic habits. Our information as to the natural foods of mollusca is very sparse, and the subject is not easy to

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1 The skin constituted 69 per cent. of the total dry weight and contained 95 per cent. of all the manganese: in the other the figures are 66 and 61 per cent. respectively.

2 *Comptes Rendus*, Vol. CXIV. (1892), p. 840; *Proc. Roy. Soc. Edinb.*, Vol. XVIII., p. 293; *Physiology of Invertebrates*, p. 145.

3 Other objections to this view are that the moderately manganiferous *Pl. corneus* has much hæmoglobin, and the highly manganiferous *Anodon* and *Unio* are commonly said to have hæmocyanin (O. von Fürth, *Chem. Physiol. der niederen Tiere*, 1903, p. 105). I found no manganese in the juices of *L. stagnalis*. It has been supposed, but apparently on insufficient grounds, that manganese is a necessary constituent of human blood, and that its absence leads to a special form of anæmia (J. Gaube, *Mineralogie Biologique* 1899, Vol. I., p. 161).

investigate; the valuable observations of W. A. Gain[1] give little positive information, since the questions of what snails will eat in captivity and what they do eat in nature are obviously distinct, except in so far as one may probably conclude with propriety that what they will not eat under artificial surroundings will at any rate not be a common food under wild conditions. Examination of the stomach contents of freshly caught specimens has occupied my attention for some time, but here again it is hardly possible to distinguish between what the snail meant to eat and the other stuff that he picked up incidentally. Water snails may, for instance, contain fragments of cellular plants with many diatoms, but we do not know whether the snail picked up the diatoms in eating phanerogamic tissue or *vice versa* or, indeed, whether what he really wanted to eat leaves recognisable remains. To find a snail habitually about some plant is not necessarily evidence that he is there to eat that plant rather than the adherent organisms; the feeding tracks of *Limnæa* and *Planorbis* are admirably displayed in the brownish coating of the under side of elderly water-lily leaves, and it seems likely that a particular plant is regularly attended for its associated algæ and the like rather than for itself. In other cases, too, it is the dead or partly decayed leaves which appear to attract particular attention.[2] Our domesticated plants are relatively open to attack by snails, and when one finds a couple of fat *sowerbyi* or *hortensis* inside a particularly fine potato or prowling up a lettuce, one has no doubt as to what they want to eat, and what, in fact, they do eat. But most green plants seem to be, when living, pretty satisfactorily protected,[3] and it is illegitimate to conclude that all the snails one finds in a favourable nettle-bed feed on nettles. It is also an open question whether each species has any particular or favourite food. *Arion ater* will eat pretty well anything—green plants, dead plants, fungi, bread, earthworms, etc.—in nature; Gain could not find anything which *Limax arborum* was prepared to enjoy. There is, perhaps, every gradation between these extremes, but just how each snail stands we do not know.

Such being our state of ignorance, it is impossible with the present data to solve the question. Certain points, however,

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[1] *Journ. Conch.*, Vol. VI. (1891), p. 349; *The Naturalist* 1889, p. 55; see also H. W. Kew on the food of slugs *ib.* p. 103 and 1893, p. 145; R. F. Scharff *Sci. Trans. Roy. Dublin Soc.*, Vol. IV. (1891) p. 513, and A. H. Cooke in *Molluscs and Brachiopods*, 1895, p. 30.

[2] *e.g.* from *H. pomatia*, which, according to W. Jeffrey (J. E. Harting, *Rambles in Search of Shells*, 1875, p. 72), is harmless to green plants in the garden, which my own observations fully confirm.

[3] See J. W. Taylor *Monograph Br. L. F. W. Mollusca*, Vol. I. (1899), pp. 286 ff.

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have been noted which suggest that locality has a good deal of influence, and locality is, in this connection, most easily interpreted as food. Thus, *M. sowerbyi* and *A. hortensis* collected together in one garden gave 13 and 12 ; from another garden only 3 and 6. The mean figure for *H. cellaria* from Aldenham district is 15 ; one locality gave as little as 3, and the *nitidula* which accompanied it 2, compared with a local mean of 10 ; another locality 4, and the *helvetica* with it 6, instead of 17. Both these localities were in wet places by the river side, and *cellaria* from a third similar place gave only 7, the figures for drier loci ranging from 17 to 34. It is difficult to resist the conclusion that in this particular sort of place *Hyalinia* has a specially low content in manganese and the suggestion that this is due to a difference in food. A third example is afforded by a series of mollusca collected one day in the great beech woods near Great Hampden, in south Buckinghamshire.[1] The mean figure for *Limax maximus* from other localities is 9, from here 56 ; the mean for *A. ater* 2,[2] from here 47 ; for *Hy. alliaria* 39, from here 99. *L. arborum* (270), *A. subfuscus* (274) and *L. cinereoniger* (86), gave very high figurres, though there are no others for comparison ; the highly manganiferous *B. montanus* and *obscurus* also occurred here. Altogether, therefore, the locality is evidently one which encourges a high content in manganese, and since all the species except *ater* were taken crawling on beech trunks, one may suppose that this habit has something to do with it.[3] On the other hand, all snails from the beech woods do not show exceptionally high figures, *e.g.*, *rufescens*,[4] *lapicida* and *laminata*, and in apparently similar woods on the Cotswolds (where the *Bulimini* give the same high figure) *rufescens, lapicida, nemoralis,* and even *alliaria*.[5] The chief locality in Aldenham for *caperata* is a beech wood with bare floor, where the species occurs freely, climbing up the trunks, but it has no more than the normal manganese content, though *A. agrestis* from the same wood has twice the normal amount.

(To be continued).

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1 A delectable locality indicated by Mr. Charles Oldham (*Journ. Conch.* Vol. XIII. (1911), p. 148) ; the woods are supposed to be some of the few remnants of the ancient forest of Bernwood (A. H. Allcroft, *Earthwork of England,* 1908, p. 29a).

2 A specimen from the roadside chalky bank close to the woods gave only 1.

3 In W. A. Gain's experiment, lichens, moss and the green growth on beech were by no means favourite foods.

4 *rufescens* alone does not commonly climb up the trees.

5 The habit of *Alliaria* to walk about openly in the daytime on trees, walls, etc., is relatively unique among the *Hyalinia,* and is presumably associated with its nasty taste (*Lancashire Naturalist,* Vol. VII. (1914), p. 311).

YORKSHIRE NATURALISTS' UNION: VERTEBRATE SECTION.

Two Meetings of this section were held in the Leeds University on November 18th, 1916, Mr. W. H. Parkin presiding.

Mr. L. Gaunt reported a 35-pound Badger being killed at Bolton Abbey on the 15th. The result of the official business of the afternoon is incorporated in the Annual Report of the Union, appearing elsewhere in *The Naturalist.*

At the evening meeting, Mr. Greaves gave a paper on 'Some Bird Observations on the Hills of the Upper Calder.'

The bleak hills of the Lower Pennines are not generally associated with a rich or varied avi-fauna, but the lecturer demonstrated that by systematic and indefatigable watching, many unusual and interesting visitors may be noted, particularly during the Spring and Autumn.

As most of our moors are now used as gathering grounds for an increased supply of water to our towns, their aspect and attraction as resting-places for migrating shore and aquatic birds have undergone a gradual but decided change, so that in addition to the resident Moorland species, there is now a fairly regular succession of immigrants affecting the small stretches of sand and mud flats surrounding the many reservoirs, the Waders, of course, predominating.

So far, the result of the survey is the satisfactory list of 135 species noted in the Hebden Bridge district, to which, no doubt, additions will be made. Mr. Greaves suggested a thorough exploitation of our inland waters during the migratory periods, as likely to yield good results.

Mr. T. M. Fowler read a paper on 'Wild Life on the Manx Shearwater and Storm Petrel in the Scillies," (see *Wild Life*), and with the aid of photographs taken at this stronghold of the two species, described the many strange characteristics affecting their resting habits.

The proceedings closed with a vote of thanks to the Lecturers and to Prof. Garstang, and to the Council of the University for their hospitality.—A. Haigh Lumby.

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The *Belfast Municipal Museum Publication* No. 57, is devoted to 'Human Pests,' the subjects dealt with being the Flea, Bed-Bug, Louse, and Itch-Mite.

The *Annual Report and Balance Sheet of the Huddersfield Naturalist and Photographic Society* (10 pages) shows a slight falling off in the membership. This Society is still keeping an interest in its work and has a good balance in hand at the Bank. The reports printed are as follows :—General and Photographic, by E. S. Maples; Natural History and Entomology, by C. Mosley; Antiquities, by J. H. Carter; Library and Ornithology, by E. Fisher; Botany, by W. E. L. Wattam; Geology, by Dr. T. W. Woodhead. From the Librarian's report, we notice there are eight Volumes of the Naturalist to dispose of, but that the Society's set of its own reports is incomplete.

YORKSHIRE NATURALISTS AT SELBY.

THE Fifty-fifth Annual Meeting of the Yorkshire Naturalists' Union was held at Selby, by invitation of the Selby Scientific Society, on Saturday, December 2nd, 1916.

The members who arrived in the morning paid a visit to Brayton Barff, an outlyer of sandstone left behind whilst the great mass of Trias, which once existed where the vale of York is, was being denuded. The geological features of the Barff were fully described by Mr. Thomas Sheppard, M.Sc.,

Photo by] [*W. Farley.*

Yorkshlre Naturalists at Selby.

in the circular convening the Annual Meeting, and reference might also be made to the same gentleman's report of the visit of the Geological section of the Union to the same locality in June, 1915 (*see* p. 264 of *The Naturalist*, 1915). A collection of the glacial erratics, and other pebbles, obtained at the Barff was placed on exhibition by Mr. J. F. Musham, F.E.S. On their return, the members were photographed, and by the kindness of Mr. W. Farley, the result is reproduced in these pages.

Mr. C. A. Cheetham writes :—The small party of botanists who joined the geological excursion to Brayton Barff was well repaid. The vegetation of this hill would be an interesting study for the local society. It appears to be the remains

of oak woodland, and some small attempts have apparently been made to introduce Spruce pines. Bracken covers practically the whole floor space, and it would be interesting to know to what extent the Blue-bell grows here, only a few fruit stalks being seen.* Mr. Burrell, F.L.S., and the writer kept a sharp look out for mosses and hepatics by the invitation of Mr. Musham, and appended are the species noted :—

Tetraphis pellucida. On dead wood.
Catharinea undulata. Exposed sand surface.
Polytrichum piliferum. Heathy places.
P. formosum. ,,
Ceratodon purpureus. Wide spread.
Dicranella heteromalla. Sand exposures.
Campylopus pyriformis. Heath land.
Dicranum scoparium. ,,
Tortula muralis. Walls.
Webera nutans. Heath land.
Bryum argenteum. Roadside and made ground of reservoir top.
Mnium affine. Woodland floor.
M. hornum. ,,
M. undulatum. ,,
Brachythecium albicans. Sandy heath land.
B. purum. Hedgerow bottom.
Eurhynchium prælongum. Woodland.
Plagiothecium Borrerianum. Heath land.
P. undulatum. Woodland.
Hypnum cupressiforme. Tree boles.
Hylocomium squarrosum. Heath land.

HEPATIC.

Lophocolea bidentata. Heath land.

Those members who were ineligible to attend the meeting of the General Committee were conducted through the Abbey by the Rev. J. Solloway, D.D., who delivered a short address on the architectural and other features of the building, and also upon the various Monastic remains still in the town.

The members of the General Committee assembled in the Museum Hall under the chairmanship of the President, Mr. W. N. Cheesman, J.P., F.L.S. The Hon. Secretaries presented the Annual Report of the Union, which recommended the following excursions for 1917 :—

Newby Wiske Carrs, Saturday April 28th.
Thorntondale or Pickering (Whit week-end), May 26th-28th.
Market Weighton, Saturday June 16th.

* The whole of the northern side is a solid expanse of colour during the flowering season.—J. F. M.

Crosshills, Saturday, July 14th.

Grassington (August Bank Holiday week-end), August 4th to 6th.

Mycological Meeting, Helmsley, in September.

By the kind invitation of the Wakefield Naturalists' Society, the Annual Meeting for 1917 will be held in that City.

The Hon. Treasurer (Mr. Edwin Hawkesworth), presented the Balance Sheet, which showed a profit on the year's working, despite the increased cost in connection with the publication of the Union's magazine. The Report and Balance Sheet were unanimously adopted.

The announcement that Sir Archibald Geikie, O.M., K.C.B., LL.D., of Haslemere, the eminent Geologist, had been appointed President for the ensuing year, was most heartily received.

No change was made in the other responsible officials of the Union. Mr. C. A. Cheetham was elected as Divisional Secretary for South-west Yorkshire, and Mr. Sheppard as the Union's delegate to the British Association Meeting.

A vote of condolence was passed to Lady Payne-Gallwey, on the death of her husband, the late Sir Ralph Frankland Payne-Gallwey, Bart., a past President of the Union.

At the commencement of the evening meeting, Mr. T. S. Ullathorne, J.P., Chairman of the Selby U.D. Council, expressed the pleasure it gave him to welcome the members to Selby. At the conclusion of the formal business, the retiring President, Mr. Cheesman, delivered his Presidential Address from the chair on 'Economic Mycology: the Beneficial and Injurious Influences of Fungi.' After remarking upon the hopeful and encouraging attitude of the public mind towards science in relation to commerce and industry, Mr. Cheesman paid a tribute to the early workers in Yorkshire Mycology, especially praising the assiduous labours of past President, the late Charles Crossland, and Mr. George Massee. He then commented upon the great variation which existed amongst fungi, and the enormous number of species known to science. Quotations were made from the writings of the Ancients, commencing from the time of Theophrastus (B.C. 287), and to the work of a Selby-born man, Thomas Johnson, who wrote an amended edition of Gerard's Herbal in 1633, and therein described and figured certain species of fungi. The economic value of fungi, especially as food materials; their use medicinally and otherwise to mankind; their injurious effects when not kept under control; the relationship of fungi to the higher plants; the biological study of their organisms and the economic success resulting therefrom, and the probable immunity of plants from fungoid pests, were

also questions discussed, and very ably dealt with by Mr. Cheesman during the course of his address, proving how keen and able a student of this class of plants he was.

Mr. Cheesman's address will appear in the pages of *The Naturalist.*

At the conclusion of his address, Mr. Cheesman was heartily thanked for his services to the Union during the year, and also for his address, on the proposition of Dr. Wager, F.R.S., seconded by Mr. M. H. Stiles.

The remainder of the evening was profitably occupied in a Conversazione under the auspices of the Selby Scientific Society. The portfolio of prints, and numerous lantern slides by members of that Society, were on view; also numerous old prints of Selby; pen and ink sketches of the Norman doorways of the churches at Riccall, Adel and Brayton; of Howden Church and Selby Abbey; and also of the storehouse of the Monastry of Selby, all the work of Mr. T. Howden. Mr. Cheesman also exhibited a copy of Johnson's Herbal, referred to in his address. The museum founded by the late Sir Jonathan Hutchinson, and bequeathed to the town of Selby, was open to members until dusk. Light refreshments were provided by Mr. Cheesman.

The concluding resolution of thanks to Mr. J. F. Musham for the excellent manner in which he had made the local arrangements, to Dr. Solloway for conducting the party through the Abbey, and to the Selby Scientific Society, was moved by Dr. Corbett, seconded by Mr. J. W. H. Johnson, M.Sc., and very heartily carried.

W.E.L.W.

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Rydal by **the late Miss Armitt,** edited by W. F. Rawnsley. Kendall, Titus Wilson, 1916, xv+727. 12s. 6d. net. Our readers will remember that the late Miss M. L. Armitt, of Rydal, was a frequent contributor to our pages. Her 'Birds of Rydal' (reprinted in the present work) appeared in *The Naturalist* for August, 1902. But for several years she worked at preparing a History of Rydal which, the editor informs us, was left practically finished at her death in 1911. It is a remarkably complete and clear account of the various vicissitudes through which Rydal has passed. Beginning with the Celt, Roman, Angle, Dane, Norseman and Norman, the history of the place is taken step by step until comparatively modern times. As illustrating the thoroughness of the book, we may quote the headings to the chapters of two of the seven 'Parts':—III., (1) Husbandry in Rydal; (2) Cattle Grazing and Marketing; (3) Corn-growing; (4) Sheep; (5) The Fisheries: IV., (1) The Typical House; (2) Husbandry; (3) The Farmholds; (4) The Smithy; (5) The Cornmills; (6) The Inns; (7) The School. In perusing the book it is obvious that Miss Armitt's reading and researches have been extensive. She has put the facts in readable form, and the book will have value far beyond the confines of the Lake District. The editor and publisher are to be congratulated upon bringing out such a substantial work in these difficult times. It is excellently produced, and the price is very moderate indeed. We trust the book will have the support it deserves.

In Memoriam.

CHARLES CROSSLAND.

It came as a painful surprise to many of us on the morning of December 11th to learn that still another of our few really prominent Yorkshire naturalists had passed away; Charles Crossland died the previous Saturday, at the age of 72 years. He was a 'worker' in every sense of that word. He believed that one was much more likely to 'rust out' than to 'wear out,' and there was no idle moment for Charles Crossland. Though, as he described himself, he was a 'Knight of the Cleaver,' and led a very strenuous business life, he yet did far more to further the interests of Yorkshire natural history than many of his fellows, albeit that he only commenced to take an interest in the subject after he had reached his fortieth birthday. As the *Yorkshire Observer* tells us, 'His daughter entered some wild flower collecting competition and the father's aid was invoked. For the first time realising that wild flowers were of interest, he possessed himself of a good book and friends of like mind, and with his ingrained thoroughness studied the botany of the flowering plants to the depths of the science of the day. When he was about 45 years of age, he was persuaded, by the head of the Mycological Department of Kew Gardens, Mr. George Massee, whose acquaintance he had made on an excursion, to take up the study of fungi, then much neglected. Mr. Crossland then plunged into the task, and he and Mr. Massee laid the foundations of a committee of the Yorkshire Naturalists' Union for the study which has made Yorkshire famous in botanical circles all over the world.'

'A great number of species previously unknown to Britain or even unknown to science, were the result of Mr. Crossland's researches, and his accumulated knowledge was recorded in the big 'Fungus Flora of Yorkshire,' which he and Mr. Massee produced, and in his contribution to the Halifax Flora, in which he collaborated with Mr. W. B. Crump. He was nearly 50 years of age when, in consequence of the difficulty of preserving his collections of fungi, he started to learn to draw and paint that he might record his finds. He developed an almost pre-Raphaelite minuteness and accuracy of touch with the paint brush, which made his pictures of scientific value; as well as a fine sense of colour, which made them pleasing works of art, and it is a testimony to their quality that Sir Joseph Prain, the Director of Kew, declared himself very glad to be permitted to purchase them for the national collection. In the study of dialect—which he spoke to perfection—in the study of the local antiquities, and in many other ways, he did excellent work. Honours fell upon him—

he was made a Fellow of the Linnean Society and President of the Yorkshie Naturalists' Union, as well as local recognition—but no honours spoilt his modest, self-effacing devotion to his work, and his eagerness to find new recruits to carry it on.' He was also President of the Yorkshire Dialect Society.

He had passed his sixtieth milestone when he undertook to prepare a 'Bibliography of Halifax,' in connection with which he was communicating with the present writer up to the week in which he died. For the past few years the Halifax Antiquarian Society has printed instalments of this Bibliography in its Transactions; the section of which, devoted to Halifax Natural History, being probably of greatest interest to him; but he did all the sections well. His one grievance, if grievance it can be called, was that in his later years, he did not seem to be able to work with quite the speed and ability of his younger—that is, middle-age—years.

Quite apart from the volumes on the Fungus Flora of Yorkshire, and the Halifax Flora, both of which are permanent monuments to his industry, the pages of *The Naturalist* for many years have given evidence of his work. Great and valuable as his published writings—on a variety of subjects—are; we are inclined to think that there was one side of his character which has probably been of greater service to Yorkshire science. That was the extraordinary patience and pains he took to interest others in the study of botany in its various branches. Very many Yorkshire naturalists, occupying prominent positions in the Union to-day, owe their first introduction to the study of nature to the thoughtfulness and infectious enthusiasm of Charles Crossland. The present writer owes him much in the way of information on a great variety of subjects; particularly if they were bearing upon out-of-the-way matters. And he can also testify, as few can, to the enormous amount of work he could accomplish. When the Fungus Flora of Yorkshire, which he had the pleasure of seeing through the press, was ready for the printers, Crossland found that it would save the printers trouble, save the Union expense, and enable him to better judge the probable cost, if his manuscript were re-written; and, though his original manuscript was remarkably clear and distinct, he re-wrote the whole, giving not only the correct number of words, but the correct number of ems to a line and the correct number of lines to a page, so that the book eventually appeared word for word, space for space, line for line and page for page, as it was in manuscript. The gigantic nature of this task alone can be better judged if any of our readers care to go to the trouble of copying out even one of the 400 pages of the Fungus Flora, most of which were occupied by the long scientific names of Fungi.

It was only after some years that the present writer prevailed upon Charles Crossland to allow an account of his work to appear in the series of 'Prominent Yorkshire Workers,' which was published in *The Naturalist*. Crossland felt that the time had not yet come for him to be included among the 'prominent' workers; and then only was sanction given after agreeing to submit the proofs to him, lest he should be receiving credit for work which was not his. To that biography, which appeared in *The Naturalist* for October, 1910, we would refer our readers for an account of his work up to that time; and the pages of this journal have gladly recorded the work he has done since. The photograph then given was one of the best he ever had taken.

Crossland was painstaking and methodical to a fault. The care with which he prepared his additions to the Fungus Flora, from time to time, is an example difficult to follow. He certainly lived a life that was worth while, which is probably the one thing he would have wished to have had said about him, had it been possible to have asked him. We are proud and honoured that he lived in our county. Yorkshire naturalists will have difficulty in filling his place; his friends in Halifax can never do so. Our loss is great, but even that is exceeded by the loss sustained by Mrs. Crossland and the family, to whom we tender every sympathy.—T.S

CLEMENT REID, F.R.S., F.L.S., F.G.S.

We regret to record the death of Clement Reid, who for many years served on H.M. Geological Survey, and who is known to Yorkshiremen by his admirable Memoir on 'The Geology of Holderness,' published by the Survey in 1885. That memoir laid the foundations of our knowledge of the glacial features of the area dealt with, and while his suggested 'Interglacial' age of the Holderness gravels is not now generally accepted, his volume contains a valuable record of details of the beds which were very favourably exposed during his survey. He wrote a similarly useful volume dealing with the Cromer district, and others bearing upon Newquay, Land's End, etc. He was specially interested in the fossil plant seeds found in the more recent geological beds, and probably knew them more thoroughly than did any of his compeers. Much of his time in recent years has been spent in their examination, and, together with the help of Mrs. Reid, he has written several papers and books bearing on the subject. Among these are 'The Origin of the British Flora' (1899), 'The Pre-glacial Flora of Britain' (1907), and numerous reports on the botany of Roman Britain. In 1890 he wrote a valuable memoir on the 'Pliocene Deposits of Britain.' He was of a retiring disposition, and always wrote

and spoke with extreme caution. In recent years, he was very helpful to Yorkshire geologists in connection with the botanical remains found in the more recent deposits in the county. He was 63 years of age.—T.S.

SIR RALPH PAYNE-GALLWEY, BART.

DEATH has of late taken heavy toll of the members of the

Sir Ralph Payne-Gallwey, Bart.

Yorkshire Naturalists' Union, and it is with deep regret that we have to chronicle the decease of one of our past Presidents, Sir Ralph Payne-Gallwey, Bart., who, after an illness of some months, passed peacefully away at his residence, Thirkleby Park, on November 24th, at the age of 68.

A sportsman-naturalist of the best type, Sir Ralph was a keen sportsman and a fine ornithologist. The combination resulted in the publication of two standard works, "The Fowler in Ireland,' and 'The Book of Duck Decoys: their

History, Construction and Management.' As a wild-fowler, he was pre-eminent, and upon his estate he constructed and maintained one of the very few Yorkshire decoys. In collaboration with Lord Walsingham (another past President of the Union) and Lord Lovat, he was responsible for two volumes upon 'Shooting' in 'The Badmington Library,' the finest volumes of the series. Other works from his ready pen were 'Letters to Young Shooters,' and 'High Pheasants in Theory and Practice.' These volumes show not only his keen interest in sport, but also what a close and accurate ornithological observer he was.

He was also a great authority upon Archery and a skilled performer with the crossbow; he held the record for long-distance shooting with this weapon. As a result of his interest in this sport, he published in 1903. an able volume upon 'The Crossbow, Mediæval and Modern, Military and Sporting.' Another work showing the many-sided character of the man, is 'Projectile-Throwing Weapons of the Ancients,' published in 1906. He also invented many useful articles connected with sport, some of which have been further developed and found of great use in the present war.

He devoted considerable time at one period to Falconry, and some of the members of the Union have pleasant recollection of the exhibition of rook hawking he gave with his Peregrines, when the Union visited him at his home during his year of office. His consideration for others was well illustrated upon that day. A visit had been paid by a number of members present to Gormire Lake; Sir Ralph drove there in a Norwegian cariole, with his boy seated behind, when, travelling down Sutton Bank at a good speed, the pony stumbled; Sir Ralph performed two or three rapid somersaults over the animal, followed by the boy. The first thoughts of Sir Ralph when he had gathered himself together was of the boy. 'Where is the boy?' 'Is he hurt?' Luckily, however, none of them were any worse for the mishap.

He published many interesting notes connected chiefly with ornithology and sport in the pages of *The Field*, etc. His interests were not, however, connected entirely with sport and natural history, for Historical studies occupied some considerable portion of his time; two works, a result of his versatile pen, which he published, may be mentioned, viz., 'History of the George worn by King Charles I. on the scaffold,' and 'The Mystery of Maria Stella, Lady Newborough.'

Nowhere will he be missed more than upon his own estates, where the happiest relations have always existed between the tenants and himself, and this appears to have been always the case upon this estate where farms have been in the occupation of successive tenants of the same families for two or three hundred years.—R.F.

J. M. CAMPBELL.

The death has recently taken place of J. M. Campbell. He was well known to many North Country ornithologists, who made his acquaintance whilst he was light-keeper on the Bass Rock.

Mr. Campbell was a naturalist of the best type. A keen, careful and original observer, his positions gave him unique opportunities of studying nature at first hand.

Whilst stationed on the Bell Rock Lighthouse, he published a charming little work upon 'The Natural History of the Bell Rock.' A somewhat amusing incident occurred with

Photo by] [*R. Fortune, F.Z.S.*

J. M. Campbell (on the right).

regard to this. On one of the visits paid to the Bass by the writer, he was comparing notes with Mr. Campbell upon certain natural history books, when he advised him to read an interesting little book written by a fellow lighthouse-keeper on the Bell Rock. 'Do you remember his name?' asked Campbell. 'No, I am sorry to say I do not.' 'Well, it was I!' This was naturally a great surprise, but a pleasant one, as it gave an opportunity of expressing sincere congratulation to the writer.

Whilst on 'The Bass,' Campbell paid great attention to the habits of the gannets breeding there, and published many interesting and valuable notes in connection with them. He

was the first to photograph a Gannet feeding its young one, not an easy subject to secure.

To all visitors he was genial and courteous, and to nature photographers he was particularly helpful, as no trouble was too great for him to undertake in order to aid them in their work. The writer and his friends have received many kindnesses at his hands. He will be generally missed and deeply regretted by the great number of naturalists and photographers who have visited 'The Bass' whilst he was stationed there.

Latterly, he was transferred as Head Keeper, to the Noss Head Lighthouse, Wick, where he continued his observations and studies with his usual keenness.—R. F.

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The Elephant by **Agnes Herbert.** London: Hutchinson & Co., 284 pp. 6s. net. This is not a scientific monograph on *Elephas*, but a book written for children interested in Nature Study. In language simple and easily understood, Miss Herbert relates the life account of an elephant; giving much sound, scientific information during the progress of the story. There are several good illustrations by Miss Winifred Austin.

The Grizzly. By **J. O. Curwood.** London: Cassell & Co., 259 pp., 6s. The author of this book, who lives at 'Owosso, Michigan,' is a reformed character! He recalls one of many instances of taking life in which he now regards himself as having been almost a criminal, as he now considers that 'killing for the excitement of killing can be little less than murder.' The author tells a tale of a gigantic grizzly, 'Tyr,' and describes the home life of the bear with a detail which clearly indicates familiarity. In addition to 'Tyr' are brother and sister bears, and an Indian attendant. The book contains a story, and must not be mistaken for a monograph on any species of *Ursus*.

British Birds. By **A. Thorburn.** London: Longman, Green & Co. Vol. IV. 107 pp. Plates 61-80. Undoubtedly one of the most remarkable achievements in the publication of natural history books, in this time of scarcity of paper and labour, is the prompt manner in which the four parts of Mr. Thorburn's work have made their appearance. The excellent and accurate drawings, the natural attitudes of the birds, and their realistic groupings, enable the identification of British Birds to be now a comparatively easy matter. The excellence of the paper and printing, and the fact that the plates are mounted on thick cards on linen guards, assist in making the work 'permanent' in more senses than one. We trust that the sale of the work will reward the publishers for their enterprise in these unfavourable times.

Windmill Land. By **Allen Clarke.** London: J. M. Dent & Sons, 287 pp., 3s. 6d. Dedicated 'To the lady whose honeymoon and mine began in Windmill Land and continues there,' this volume contains a series of chatty and informative articles which originally appeared in newspapers and magazines. He describes the county in the northern half of Lancashire, 'The Golden Cornfield of Amounderness,' where there are no railways, no steam engines, no electric cars, no gas, no water-mains—candles and rain-tubs and pumps—in short, Windmill Land, with all its pleasant paths and rustic charm.' In twenty-two chapters the author has gathered together much quaint lore relating to windmills, and with the aid of pen, photograph and anecdote, gives a valuable and readable account of the charming county in which he lives.

NORTHERN NEWS, etc.

The *Thirty-eighth Annual Report of the Libraries and Museum at St. Helens*, contains particulars of a gift of two large pictures, which have been renovated. It is pleasing to notice that the Museum is 'growing in interest and value each year, and continues to attract a large number of visitors,' especially as the amount provided for Museum purposes appears to be £36 os. 4d., apparently all of which has been expended.

A resident in a well-known Yorkshire city promised his boy that 'someday' he would take him to the local museum. After several reminders, he at last put off his harmless, but necessary, game of golf, and spent two long hours in explaining the various exhibits to his young hopeful. Being far more tired than if he had 'done' an eighteen-hole round twice, he sat down, and awaited the boy's verdict. After a painful silence the boy looked up and said, 'Father, when does it begin ?'

In *The Meaning of Life* for December (8 pp.) 'E.K.R.' tells us that 'undoubtedly' there is a soul-line, 'a line above which creatures have a spiritual consciousness or instinctive knowledge that they possess a soul . . . . and I am not inclined to say that an intelligent domesticated animal, after long companionship with good human beings, may not acquire a glimmering of it.' In the same publication we learn that 'khaki' is 'a little word of five letters.' We have counted them and find this to be correct.

Liverpool University has received a gift of £10,000 for the endowment of a chair of geology. In making the announcement at the Annual Meeting of the court, Alderman Alsop said the gift was from Professor and Mrs. Herdman, who desired the chair to be a memorial to their son, George Andrew Herdman, who was killed in action on the Somme, and who was an earnest student of nature and deeply interested in scientific investigation. Professor Herdman was one of their oldest professors, and Mrs. Herdman, who belonged to a family known for its gifts and service, was formerly a distinguished student of the old University College.

We learn from the press that at Thirsk recently 'Enoch Kitching, innkeeper, South Otterington, was summoned under the Wild Birds Protection Order for shooting a bittern on November 9th. Defendent pleaded guilty to shooting, but said he did not know it was a protected bird. Supt. Walker, Northallerton, said defendant told him he thought the bird was a seagull. Bitterns had frequently tried to settle in the district, but had been 'unfortunate in meeting with men like Mr. Kitching.' The Superintendent asked for the full penalty, which was only £1. The Bench fined defendant £1, including costs.' Bearing upon this is the following note in *The Field* for November 25th, 1916 :—'A fine Bittern was shot on November 9th by Mr. Enoch Kitching, in the Otterington Willow Garth, near Northallerton, and has been entrusted to us to mount' (Edward Allen & Co., York).

We have just received the *Annual Report of the Brighton and Hove Natural History and Philosophical Society* for 1916. It contains an account by Mr. A. W. B. Anderson of his alleged discovery of fossil animal bones, which Mr. Toms stated were only ordinary flints (see *The Naturalist*, 1915, page 376). Apparently the specimens were submitted to the authorities at the British Museum, but they were not able to support Mr. Anderson's theory; notwithstanding this he still continues in his belief that he is right ! In the same publication, Mrs. Maud Dickinson writes on 'Vegetable Radium,' which was referred to in this journal for July, 1916, page 214. There are reports on other papers dealing with 'Modern Explosives,' 'Inland Navigation,' 'Thoreau,' 'Evelyn,' etc. Personally we should like to see a few more papers bearing upon the district covered by the Society's Transactions.

NEWS FROM THE MAGAZINES.

Mr. W. Mark Webb illustrates 'The British Species of Testacella,' in *Knowledge* for November.

In *The Zoologist* for November, the Rev. F. C. R. Jourdain writes on 'The Status of the Black Redstart in England as a Breeding Species.' and Mr. E. B. Dunlop gives a contribution to the Life History of the Herring-Gull.

A writer in *The Field* for November 25th, 1916, p. 804, states that the late lamented George Mitchell added a new chapter to the history of falconry when he accomplished the feat of killing a number of Snipe with Merlins.

In *The Entomologist's Monthly Magazine* for December, Mr. H. Britten adds six species and one variety to the list of Cumberland Hemiptera, which appeared in *The Naturalist* for August, 1916. An exotic Blattid, *Rhyparobia maderæ*, is recorded at Halifax.

'Notes on the Diptera of Derbyshire,' by Eric and Hilda Drabble; and 'Biological and Systematic Notes on British Thysanoptera,' by C. B. Williams, appear in *The Entomologist* for December. In future, the subscription to this journal is to be advanced to 7s. per annum.

Under the Heading of 'Agriculture and the War,' the *Journal of the Board of Agriculture* for November contains a 'Report of a Meeting between the President of the Board of Agriculture and Fisheries and Members of the Somerset War Agricultural Committee and others at Taunton.'

On account of the extra cost of production, the price of *The Entomologist* will in future be 7s. per annum. The December issue contains 'Notes on Derbyshire Diptera,' by Dr. Eric and Hilda Drabble, and 'Biological and Systematic Notes on British Thysanoptera,' by C. B. Williams.

The New Phytologist, Vol. XV., No. 8, contains the following items :— 'Recent Developments in the Study of Endotrophic Mycorhiza,' by M. Chevely Rayner; 'Carbon Assimilation,' by Ingvar Jörgensen and Walter Stiles; 'The Translocation of Latex and the Multiple Razor,' by James Small; 'The Natural History of a Siberian Coal,' by M. D. Zalessky.

Wild Life for November contains an excellent series of photographs illustrating the nesting of Montagu's Harrier. Mr. R. Chislett writes on 'Photographing the Sand Martin'; Mr. J. K. Emsley uses many illustrations in his 'Description of the European Lynx'; Mr. E. Selous continues his observations on 'Sexual Selection in Birds,' and there are many other shorter notes.

In *The Mineralogical Magazine* for November, Dr. G. T. Prior has two papers on Meteorites; Dr. J. W. Evans has two technical papers bearing upon Petrology and the Microscope; Mr. A. Holmes describes a series of rocks from Angola; Dr. T. L. Walker writes on Spencerite, a new zinc phosphate from British Columbia, and Mr. L. J. Spencer illustrates and describes a Butterfly-twin of Gypsum from Italy.

British Birds for December contains a remarkable record of the progress of its Bird Marking Scheme during 1916, by H. F. Witherby, and Miss M. D. Haviland has some valuable illustrated notes on Temminck's Stint. In the way of new Sussex records, however, the Journal has 'broken out again.' In May last, two male collared Flycatchers were shot near St. Leonards, and those and two others are the only authentic British occurrences; also in May a Savi's Warbler was shot near St. Leonards, and except for those recorded in Fair Isle in 1908, this is the only authentic occurrence of the bird in the British Isles, since about 1856. These three Sussex birds were 'examined in the flesh' by Mr. R. Butterfield, presumably about May last, and in view of their apparent extraordinary importance, one wonders why they have only been just recorded.

A YEAR'S SCIENTIFIC WORK IN YORKSHIRE:

BEING

THE YORKSHIRE NATURALISTS' UNION'S FIFTY-FIFTH ANNUAL REPORT

FOR 1916.

(Presented at Selby, 2nd December, 1916.)

THE FIFTY-FOURTH ANNUAL MEETING was held at Keighley on Saturday, December 4th, 1915. *The Naturalist* for January, 1916, contains a report of this most successful gathering, organised by the Keighley, Crosshills, and Earby Naturalists' Societies. The Presidential address of Mr. Riley Fortune, F.Z.S., on 'The Protection of Wild Life in Yorkshire' has likewise appeared in the same Journal, pp. 53-59; 92-95; 124-131; 151-154; 183-188.

THE FIELD MEETINGS for the year have been six in number. The Excursion fixed for the August Bank Holiday week-end to Wentbridge was, owing to the withdrawal of that particular holiday, curtailed to a single day. Despite the strenuous energies which are called forth on behalf of our country in connection with the greatest war in history, and the continued absence of cheap travelling facilities, the majority of these meetings were well attended. The Excursions were as follows—

Malton (Easter week-end), April 22nd to 24th.

Bolton Woods, Saturday, May 20th.

Middleham (Whit week-end), June 10th to 12th.

Driffield, Saturday, July 8th.

Wentbridge, Saturday, August 5th.

Buckden (Mycological Meeting), September 23rd to 28th.

The usual programmes have been printed and circulated prior to each meeting, and reports of the Excursions have appeared in the pages of *The Naturalist.*

Successful Sectional meetings have also been held during the autumn and winter months. Permission to visit estates has readily been granted by various landowners, to whom thanks have been accorded at the close of each Excursion.

The Excursions for 1917 will be as follows :—

Newby Wiske Carrs, Saturday, April 28th.
Thorntondale or Pickering (Whit week-end), May 26th to 28th.
Market Weighton, Saturday, June 16th.
Crosshills, Saturday, July 14th.
Grassington (August Bank Holiday week-end), August 4th to 6th.
Mycological Meeting, Helmsley, in September.

The Annual Meeting for 1917 will be held at Wakefield, by the kind invitation of the Wakefield Naturalists' Society.

Obituary.—It is with regret that we record the death of the following members during the year, viz. :—Mr. W. Barraclough, H. E. Dresser, F.Z.S., F.L.S., (an ex-President of the Union) ; Sir Ralph Frankland Payne-Gallway, Bart., Thirkleby Park, near Thirsk (an ex-President of the Union) ; J. A. Harvie-Brown, F.R.S.E., J. R. Stubley and Mr. B. Turner. 'In Memoriam' notices of these gentlemen have appeared in *The Naturalist*.

Divisional Secretaries and Local Treasurers.—The thanks of the Union are tendered to these gentlemen for the valuable services rendered during the year.

General Committee.—The following have been added to the permanent General Committee :—

Active Service Members.—Further members of the Union who have joined the Forces during the year are :—Mr. Charles N. Barr, Mr. S. H. Couldwall, Mr. W. A. Millard, B.Sc., Mr. George Sheppard, B.Sc., Mr. A. R. Sanderson, Mr. S. H. Smith, Mr. T. Stainforth, B.Sc., B.A., Mr. E. W. Taylor, and Mr. F. W. Whittaker.

BIOLOGY SECTION.

Marine Biology Committee.—Dr. J. Irving writes :—Notwithstanding a serious attempt to organize a meeting of this Committee at Scarborough, in September, owing to war and other contingencies arising out of it, the attempt proved a failure. During the year some work on the coast has been done by one or two of the members, but the result has not materially added to the records of previous years.

Yorkshire Micro-Biology Committee.—Mr. J. W. H. Johnson, M.Sc., writes :—During the past season the work of this Section has been very seriously impeded. However, notwithstanding the difficulties incidental to the war and the

illness of active members, some valuable work has still been performed. Most of the common organisms were of frequent occurrence ; the interesting flagellate *Anthophysa vegetans* (O.F.M.) Busc., was found in quantity near Harrogate during the early months of the year.

VERTEBRATE ZOOLOGY.

West Riding.—Mr. H. B. Booth reports :—Nesting notes perhaps have yielded the most interesting results in 1916. Almost all the summer immigrants arrived later than usual, with the exception of the Swift, which again arrived early, and in numbers. Mr. A. Haigh Lumby saw two at Cottingley on April 24th, and I saw about a dozen at Bolton Abbey on April 29th, and they were also reported from many quarters about the same time. The most interesting nesting note is that of the Stonechat. Mr. W. Greaves sent me word that a friend of his (Mr. D. Sutcliffe) had seen a pair of Stonechats at Threshfield, near Grassington, on June 19th. On July 8th, I had the satisfaction of seeing a male, female, and one young Stonechat just able to fly, at the exact spot indicated, so that it may almost be taken as presumptive evidence that they had nested there. These are the first Stonechats that I have ever been able to see in the West Riding during the nesting season.

Very curiously, when I reported this occurrence to the president of this section, he replied that he had seen a female Stonechat with ' feed ' in her beak on the following day (July 9th) at Menston, in the same dale. Neither Mr. Parkin nor I were able to see anything further of this bird, or her relatives, later. Another interesting record is that of the nesting of the Chiffchaff in Upper Airedale, at Gilstead, Bingley (S. Longbottom), but the lateness of the dates almost points to it being a second brood, although the birds had not been previously noted in the neighbourhood. It was first heard on June 11th, and in conjunction with Mr. E. P. Butterfield, Mr. Longbottom discovered that there was a pair engaged in nest-building. The first egg was laid on June 18th ; the completed clutch of five eggs was noted on June 23rd ; and on July 5th all the eggs had hatched, and eventually the five young safely left the nest. This is the first nesting of the Chiffchaff so high up Airedale that I have known It has been reported as nesting at Apperley Bridge (Mr. Dodd), and about 27 years ago a clutch of eggs was exhibited at the Bradford Natural History and Microscopical Society's meeting by Mr. C. Allen, which had been taken at West Wood, Baildon. That season and for several seasons after, two friends and myself frequently visited the spot without, however, seeing or hearing the Chiffchaff.

I have carefully investigated the report that several pairs of Short-eared Owls have nested on Grassington Moor during the last few years (ante pp.34 and 185) and find it to be inaccurate. I had the good fortune to come across the gamekeeper there (Cousins), and gathered from him that there was not a word of truth in the report. He described these birds accurately that he occasionally saw in the autumn; but he did not know their name; yet he was quite certain that neither they nor their nests occurred in the summer on that moor, and he had been the gamekeeper there for the past eight years. There was good evidence that the Long-tailed Tit was again nesting in Upper Wharfedale, and in the same dale the Bullfinch was increasing as a nesting species. The Hawfinch appeared to be decreasing there, but it has certainly increased as a nesting species on the western suburbs of Keighley.

The nesting of most species of birds was quite two to three weeks later than usual—probably owing to the cold, backward season. I have had many reports of belated nesting from which I select the following:—

A Woodcock hatched off its four eggs near to Strid Cottage, Bolton Woods, on July 12th* (T. Roose).

A Snipe was sitting on four eggs near Headingley during the first week in July (J. Atkinson).

A Sparrow-hawk's nest noted with half-grown young at West-end, Washburndale, on Sept. 2nd, and a Nightjar still sitting on eggs on Keighley Moor on Aug. 13th, reported by Mr. F. H. Edmondson.

Game birds have had a good season—I have never before seen so many Red Grouse on the moors in September.

A Dotterel was identified on Fly Flatts reservoir on Aug. 28th (Mr. D. Sutcliffe—per W.G.). This species is very rarely seen in the West Riding on its autumnal migration—although formerly it was always expected (and looked forward to by those in search of feathers for angling) on several of our moors from the 9th to the 16th of May. A Great Grey Shrike was watched by members of the Crosshills Naturalists' Society on Oct. 31st, close to Bolton Abbey station, when it attacked and killed a Robin. A Sheld-Duck (now in the Morley Museum) a few Common Scoters, a Greenshank and several Ringed Plovers are reported from the reservoirs in the neighbourhood of Hebden Bridge (Mr. W. Greaves). Mr. Greaves also reports that a pair of Stonechats spent the winter (October to February) in that district—an unusual proceeding. Mr. A. R. Sanderson reported a Nuthatch in Mickley Woods, near Tanfield, in the nesting season. I have not a single report of the Grasshopper Warbler from the whole of the Riding this year.

* A note in *The Field* of Aug. 12th reported a young brood of Woodcock on Aug. 5th!

Naturalist.

Mr. R. Butterfield reports a Little Auk * from Cottingley Bridge, and some Mealy Redpolls near Wilsden, in early March. In *The Zoologist* for April, 1916, Mr. E. P. Butterfield suggests that some of them may have been Cones's Redpolls.

EAST RIDING REPORT.—Mr. E. W. Wade writes :—In consequence of a wild and wet spring our breeding birds, with but few exceptions, were late in nesting.

Redshanks were unusually early, many of them having laid by mid-April, but by the second week of May the breeding grounds were under water and many eggs destroyed.

An unusually large number of Turtle Doves was observed in the East Riding, and the bird was breeding in localities where it had not been previously seen.

The Corncrake has been scarcer than ever, only four breeding pairs being reported. The usual reports of the birds being slaughtered on the autumnal migration come from the southern counties, and it is a pity something cannot be done to stop this.

Partridges have had the worst season since 1878, and Pheasants have had a bad season, there being no rearing to compensate for the disastrous effects of the wet weather.

On 7th May a Pied Flycatcher (male) was observed at Burton Constable Park, and on 13th May, another bird (female), but they did not stay to breed.

There has been a satisfactory increase in the numbers of Goldfinches breeding locally, probably because the scarcity of labour has caused a great increase in the crop of thistles.

Migrants generally arrived earlier than last year

On 26th February a Little Auk was picked up alive at Scarborough ; one at Warter in the same month, and another dead at Cottingham.

On 30th April I saw a Peregrine Falcon near Newport.

On October 9th two Quail were observed during partridge shooting at North Dalton.

A Greater Spotted Woodpecker ♀ was shot at Cawood.

The Pink Footed Geese arrived in the Wolds on 21st Sept.

There has been an increase in the number of Stone Curlew in the protected area on the Wolds, seventeen having been seen in October. The birds arrived on 12th April. No doubt the decrease in the number of shooting men, owing to the war, has had something to do with this.

Mr. J. Taylor reports from Hornsea that seven young Whoopers were on the Mere on 29th September, and on 30th September, while duck shooting, his dog set a Bearded Tit (male) out of the reeds on the South side of the Mere. He had a good view of the bird and could not be mistaken.

* Another Little Auk at Barden on March 1st, (see *The Naturalist*, 1916, p. 173).

A large fall of cliff occurred early in May, a little to the N.N.W. of Haitley Shoot, the cliff face scaling off for a distance of about eighty yards, and driving off large numbers of breeding birds, who had settled down for the season. Instead of seeking other nesting quarters, they remained in the water opposite their old home all the season, only a few of them finding nesting places on the newly exposed cliff face in June.

North Riding Report.—Mr. T. H. Nelson writes:—The Military restrictions on the coast are not relaxed, and observation of bird-life is rendered extremely difficult.

The only notes of interest relate to the presence of three pairs of Sandwich Terns, which frequented the Tees Bay and neighbourhood from the beginning of May until the middle of August, but it was not possible to ascertain if they nested in the Tees area.

Mammals, Amphibians, Reptiles and Fishes.—Mr. H. B. Booth reports:—A Badger was dug out, with considerable difficulty, and after three days' work, at White Crag, Silsden, on March 31st (Mr. R. Butterfield). A colony of Long-eared Bats was walled in at Dent a few years ago by Mr. W. Hicks (Mr. F. H. Edmondson). The 'record' British Fox near Bingley was proved to be an entire fabrication (ante 1916, pp. 173-4).

Three Badgers were trapped in Brantingham Dale last winter and over a dozen at Newbald.

Mr. J. F. Musham reports that on 29th December, 1915, an Otter (female) was killed at Spaldington, and on 1st January, 1916

Fishes.—An Eel 27 inches long was taken near Hebden Bridge (Mr. W. Greaves), and Grayling have so increased in some portions of the Wharfe, that I am assured by reliable angling friends that the 'reach' from Bolton Abbey until near to Burnsall is the finest Grayling 'stretch' in the county.

WILD BIRDS AND EGGS PROTECTION COMMITTEE.

Spurn.—Mr. Johnson Wilkinson writes:—I much regret we have not been able to have any watchers at Spurn this season. We applied in the first instance to the Headquarters, Humber Garrison, Hull. The General Commanding Officer there gave a most decided answer that no watcher could be allowed. Mr. Wade then kindly visited the Headquarters, unfortunately with the same result, but was promised that Bills should be posted for protection of both Eggs and Birds. During the season, I received letters mentioning the destruction of Eggs, so a second application was made to the Military Authorities. The General Officer replied that he could not

alter his previous decision, but would issue very stringent orders for the protection of both Birds and Eggs. From one of the Officers, I received a letter saying that from personal observation, both by himself and other Officers, since the Railway was put along the Spurn, birds had not gone there.

Bempton.—Only one young Falcon appears to have been hatched and it is thought to have got safely away, as it was seen many times flying about at the close of the egging season. The quantity of eggs taken by the gatherers seems to have been about the same quantity as usual.

Unfortunately the Ravens put down last year have all left.

North Yorkshire.—I have unfortunately a sad tale to tell about the young Peregrines. Four eggs were laid, and seen by Mr. Edmondson, who wrote expressing the care taken by the watcher. On May 31st, I received a letter to say the young ones had been shot on the nest. I at once put the matter into the hands of the Police, who visited the place and saw the man who was alleged to have shot them, but no real proof could be brought against him and the matter had to be dropped. I wrote the Royal Society for Protection of Birds, who were equally desirous of taking the matter up. I also put myself in communication with the Agents of the Estate, and received the following reply :—" I have attended to the matter and trust there will be no further cause for complaint." There is no doubt that Falcons breeding in the middle of a Moor run a great chance of getting shot as they are looked upon by many people as vermin."

Hornsea Mere.—There have been many Pochards and Tufted Ducks this year. Both have done well, especially the latter. A dead Sclavonian Grebe was picked up in December last ; a most unusual thing.

There have been more Great Crested Grebes this season than for the last seven years, and all have done well, but unfortunately the Mere has been much disturbed by military operations.

Many dead Swifts have been picked up ; also a Spotted Crake.

Stone Curlews.—Sons of the watchers, who have taken great interest in the birds, and assisted in finding nests, have all joined the Army, so that the nests have not been found as before, but the usual quantity of young birds have been seen and their calling heard in the evenings.

Finance.—Expenses have not been as heavy as usual, but the balance in hand will be useful when stricter watchfulness can be resumed at the conclusion of the war.

CASH ACCOUNT.

Receipts.

	£	s.	d.
Balance brought forward	9	12	1
Mr. W. H. St. Quintin	5	0	0
Mr. Leonard Gaunt	3	3	0
Mr. Jasper Atkinson	1	1	0
Mr. E. W. Wade	1	1	0
Mr. Johnson Wilkinson	1	1	0
Mr. H. B. Booth	1	0	0
Mr. F. H. Edmondson	1	0	0
Right Hon. Milnes Gaskill (Donation)	1	0	0
Mr. G. T. Porritt	0	10	6
Mr. A. H. Lumby	0	10	0
Mr. W. H. Parkin	0	10	0
Mr. S. H. Smith	0	5	0
Rotherham Naturalists' Society	0	5	0
Bank Interest	0	4	6
	£26	3	1

Payments.

	£	s.	d.
December, 1915: Paid to Watchers			
Spurn	1	0	0
Bempton	1	0	0
re Stone Curlews	2	0	0
North Yorkshire	1	0	0
Hornsea Mere	6	0	0
Cash at Bank	15	3	1
	£26	3	1

Audited and found correct,
W. E. L. Wattam, 15*th September*, 1916.

CONCHOLOGICAL SECTION.

West Riding.—Mr. J. Digby Firth writes:—We are able to report one addition to the County list in *Pseudanodonta* Sp., taken at Agbrigg, near Wakefield, in January last, an account of which appeared in *The Naturalist* for July. *Paludestrina jenkinsi*, a species which seems to be rapidly extending its range in the West Riding, has also been taken in the same locality. Mr. Hargreaves is investigating certain alien land

mollusca imported into the county along with grain. Many arrive in a living state and they have been noticed in an active condition on the refuse heaps where the 'screenings' of the grain have been deposited, and no doubt remain alive for some weeks.

Most of the field meetings have been attended by our President, and other members of the section. The number of species recorded at the various meetings is as follows :—Malton, 36 ; Bolton Woods, 27 ; Coverdale, 21 and Wentbridge, 16.

East Riding.—Mr. J. F. Musham writes :—At Selby *H. arbustorum* seems to be on the decrease. It is also interesting to report that the little colony of *Hyalinia lucida*, discovered at Selby in 1911 is still existing ; an isolated find like this suggests accidental importation.

ENTOMOLOGICAL SECTION.

Lepidoptera.—Mr. B. Morley writes :—Military restrictions have prevented coast and night collecting. Owing to the cold, wet weather, which prevailed practically the whole of the season to July, very few insects were seen. Since July noctuæ have been common.

Eupithecia plumbeolata has been added to the Skelmanthorpe district list by the capture of two specimens in May, and careful search amongst poplar in June for larvæ of *Tethea subtusa* resulted in an abundance being found in the same district. The species was first recorded two years ago, but evidently it has long been established in the neighbourhood. Black specimens of *Ematurga atomaria* were taken in June on the Moors to the south of Holmfirth. This form has now been taken on all the moors in the South West Riding, and is evidently becoming more common.

Coleoptera.—Mr. W. J. Fordham writes :—It is impossible at this early date to give a list of beetles obtained during the year by the members of the Committee. Several interesting species have been added to the Yorkshire list. A full and detailed account will appear later in *The Naturalist*.

Hymenoptera, Diptera, and Hemiptera.—Mr. Rosse Butterfield writes :—The most interesting addition to the hymenopterous fauna is that of the aquatic "fairy-fly," *Caraphractus cinctus* Haliday. Mr. A. R. Sanderson found several specimens of this Mymarid in an observation tank in which had been placed acquatic plants brought from Austwick Moss (see *The Naturalist* for November). A Mymarid is said to have been found previously in a pond near Skipton, but no record was made.

The past season has not been favourable for aerial Hymenoptera, although additions have been made in parasitic groups. The capture of *Vespa germanica* near Keighley makes the list of British social wasps complete for the West Riding.

Mr. J. F. Musham writes :—' Throughout the Selby district Bombi have been scarce during the summer.' This appears to have been the case in other parts of the County where information has been obtained, though apparently normal numbers of queens appeared in spring. A large number of fertile queens of both social bees and wasps perished as a result of cold during May. Another specimen of *Sirex juvencus*, writes Mr. E. G. Bayford, is recorded by the Rev. F. D. Morice (*Trans. Ent. Soc.* 1916 p. 10). The only genuine British specimens of this insect have both occurred in Yorkshire, viz., at Doncaster and at Wakefield.

Good work in the order Diptera has been done by members of the Bradford Naturalists' Society, and a number of critical specimens are still in the hands of the Society's recorder, Mr. J. H. Ashworth, awaiting further examination. *Dolichopus discifer*, taken by Mr. F. Rhodes at Sunnydale, Bingley, is a noteworthy addition. *Ischyrosyrphus glaucius* has been taken at Grassington and Woodhall Hills. Mention here should be made of the occurrence of the new and rare dipteron *Xylophagus ater* determined by Mr. Grimshaw (Skelmanthorpe, 1915, Mr. B. Morley). Mr. W. H. Burrell makes an addition in the shape of the gall-fly *Asphondylia ulicis*, Verrall. He says an interesting point is that at Allwoodly Moor, near Leeds, *Ulex gallii* is the host ; a few galls have been seen on *U. europaeus*, but bushes of *U. gallii* are most affected. This is perhaps due to the period of flowering. The fly emerges freely in September when *U. europaeus* has ceased flowering. The following are also additions, *Culex nemorosus* (Bradford), *Bibio lacteipennis* (Oakworth), and *Catabomba selenitica* (Board Hill).

Hemiptera-Homoptera have received no attention apart from the account of ' The Psyllidæ of the Clevelands,' by J. W. H. Harrison, *Naturalist*, December, 1915, wherein 22 species are mentioned.

Arachnida.—Mr. W. Falconer writes :—During the year, the following papers dealing with the Arachnida of the county have been published in the *Naturalist* : (1) The Harvestmen and Pseudoscorpions of Yorkshire, March to June. (2) in ' Yorkshire Naturalists at Bolton Woods," August. (3) The Distribution of Spiders in the East Riding, September and December. (4) Foreign Spiders in Yorkshire, November.

Late in 1915 and early in 1916, Mr. Stainforth forwarded for identification, a very extensive collection of spiders, etc.,

from the East Riding, amongst them being two species new to the county, *Prosopotheca incisa* Camb. (a very rare British spider), and *Scotina gracilipes* Bl. ; several new to v.c. 61, including *Hahnia helveola* Sim., *Oreonetides firmus* Cambr., *Mengea scopigera* Grube, *Cnephalocotes interjectus* Cambr., *Cornicularia vigilax* Bl. and *Pachygnatha listeri* Sund. ; and a few others such as *Lophomma subaequale* Westr., *Panamomops bicuspis* Cambr., *Cercidia prominens* Westr. (1st Yorkshire ♂), second records of rare species for the same division, while *Cornicularia kochii* Cambr. turned up at a new station (Hornsea Mere), and another pair of *Erigone spinosa* Cambr.* at Saltend Common. In v.c. 63 *Diplocephalus protuberans* Cambr. ♂ was taken in Drop Clough, the third Huddersfield locality (the only other British station being Gibside, County Durham), and *Lophocarenum mengii* Sim., in particular abundance, both sexes, in the Chew Valley, Greenfield, where also two ♂ *Evansia merens* Cambr., the last again in nests of *Donisthorpea nigra*. In v.c. 64 *Diplocephalus castaneipes*, Sim., ♂ ♀ occurred on the summit of Ingleborough, *Troxochrus scabriculus* Westr., new to the v.c., in three localities about Ingleton (the only inland county records), and *Tmeticus graminicola* Sund., at Linton Common, where it literally swarmed on bushes. *Lophocarenum nemorale* Bl. ♀, River Cover (W. E. L. Wattam) is new to v.c. 65.

The investigation of the mites continues and several new county and some British records have been made, particulars of which will be given later. Authorities to whom the mite recorded as *Smaridia papillose* Herm., was submitted, disagreed as to its identity, and eventually Dr. George described it as a spec. nov. under the name *Trombidium parvum* (*Nat.*, June, pp. 189-190). There is, however, no doubt in the case of the allied species, *Smaridia impulliger* Berl., taken by Mr. Stainforth at Brantingham Dale in April.

BOTANICAL SECTION.

Flowering Plants.—Mr. J. F. Robinson writes :—At the various field meetings, a fair attendance and a steady interest have been maintained—*vide* exhaustive reports in *The Naturalist* of late months. New localities of certain uncommon and interesting species have been discovered, as for example, in the case of *Carex paradoxa*, Willd. in two stations near Driffield, *Carex Pseudo-cyperus*, Linn, near Hull, and *Epipactis palustris*, also near Driffield. The confirmation of a number of stations of former well-known species supposed to be among

* *Vide The Naturalist*, Jan. 1914, p. 32.

those designated 'vanishing' ones, is pleasant to record, especially as in some cases the growth is now luxuriant, or even rampant, e.g., *Lastrea Thelypteris*, in the comparatively recently discovered spot near Driffield. In a less degree, the same may be said of *Ranunculus Lingua* Linn., *Schœnus nigricans*, Linn. and *Sparganium simplex*, Huds.

Mr. J. Holmes reports finding *Andromeda polifolia* in flower on Ickornshaw Moor, v.c. 63, on May 27th.

Mr. C. A. Cheetham writes:—Interesting papers have appeared in *The Naturalist* during the year, amongst which are:—

'Wild Roses of Durham,' by J. W. H. Harrison.

'Yorkshire Hawkweeds,' by J. Cryer.

'Lichen Flora of Harden Beck,' by T. Hebden.

'Notes on Brefeldia,' by A. R. Sanderson; and

'Plants of Commondale,' by J. G. Baker.

Information has been readily given in reply to enquiries as to the fruiting of the commoner trees and shrubs, and the noticeable failure is that of the ash; the rest, though varying somewhat in different districts, seem to have had an average crop, perhaps the roses might be put down as specially full of fruit.

Mr. Cockerline reports that the Leeds Cooperative of Field Naturalists have been paying special attention to the alien flora of their district and have been successful in adding several species to the British list, which will be published later. In view of the many different sources of grain that are being utilized at present, it would repay societies to keep a watch on these alien plants and note any alterations.

Botanical Survey Committee.—Dr. T. W. Woodhead, M.Sc., writes:—The work of the year has been very satisfactory and the evening discussions at our Excursions have proved both helpful and suggestive. The studies of *Molinia*, by the Rev. T. A. Jefferies, have been continued, and an account of the vegetative anatomy of this plant was published in Vol. 15 (1916) of *The New Phytologist*. Further work by him on Molinia-peat is making good progress. Interesting peat problems were raised during the excursion to Austwick in August, and at a joint meeting of Botanists and Geologists held at Bradford in October, a very profitable discussion took place on the features observed on the Ling-covered areas of

the limestone plateau at Moughton. An investigation has also been commenced on the development of the vegetation in seven selected turbary pools on Austwick Moss, in which Mr. W. H. Burrell and Mr. C. A. Cheetham are taking keen interest. Preliminary notes on this work have appeared in *The Naturalist* for August and November.

Bryology.—Mr. W. Ingham B.A. writes :—Mr. C. A. Cheetham has added *Trichostomum nitidum* to v.c. 64 at Austwick. Mr. W. Bellerby has added *Sphagnum batumense* to Yorkshire, found at Goathland.

Mr. W. Ingham has added *Sphagnum auriculatum* var. *ovatum* found at Little Beck, v.c. 62 and *Philonotis caespitosa*, var. *orthophylla*, Lske. (Saltersgate Beck, v.c. 62) *S. imbricatum* var. *affine* (Arncliffe Wood, v.c. 62) to Yorkshire. He also found *S. pulchrum* in Fen Bog, near Goathland, v.c. 62.

Mycology.—Mr. A. E. Peck writes :—The Mycological Committee has been officially represented at all the Meetings of the Union held during the year. Reports will be found in *The Naturalist* for August, 1916, pages 266, 270, 299 and 303.

The Annual Foray was held at Buckden in Wharfedale, from September 23-28 and was well attended. Large numbers of species were obtained, some of which were new to Britain, and several were additional records for Yorkshire, of which an account will duly appear in *The Naturalist.*

The Naturalist of January, 1916, page 19, contains a note by Mr. Massee respecting the Stinkhorn, *Ithyphallus impudicus* and its occasional occurrence bearing a veil. Oddly this feature has again been noted by Mr. Peck on a specimen growing at Cloughton, September 1916. In *The Naturalist*, June, 1916, Mr. A. R. Sanderson gives a list of Mycetozoa noticed by him in 1915, two of which are new to Yorkshire.

GEOLOGICAL SECTION.

Geological Section.—Messrs. J. Holmes and C. Bradshaw report :—The postponement of the Bank Holidays prevented many members from attending the Middleham and Wentbridge meetings.

At Malton, quarries in the Oolitic Limestone were visited and typical fossils collected. Glacial problems of the district also received attention. At Bolton, the limestones, shales, and grits of the Wharfe Valley were examined with interesting results.

At Driffield, a visit was paid to the Chalk quarries, and

afterwards the large and excellent collection of Chalk fossils in the Mortimer Museum was inspected.

Lecturettes on geological subjects have been given at two of the week-end meetings.

The Geological and Botanical Sections have held a joint meeting to discuss certain problems connected with the distribution of plants in the Settle district.

GLACIAL COMMITTEE.—Mr. J. W. Stather reports :—

ROSEBERRY TOPPING.—Mr. J. J. Burton, J.P., writes that there is now an exposure of a great number of well-marked striæ on rock in situ, on the face of Roseberry Topping. The direction of the striæ is towards the S.E. by E. (magnetic compass) and at an elevation of approximately 780 feet.

HUNMANBY.—In *The Naturalist* for August, page 248, Mr. T. Sheppard, M.Sc., gives an account of a recent visit to a clay and gravel pit near Hunmanby Station. The beds are described and 26 varieties of boulders noted. No large boulders of chalk were seen.

HUDDERSFIELD.— In *The Huddersfield Naturalist and Photographic Society's Annual Report*, just issued, Dr. Woodhead describes some sections in the Spur separating the Colne from the Lees Beck. This shows boulder clay, etc., and indicates with the ice extended southwards beyond the northern bank of the Calder, which is further than was previously supposed.

COAST EROSION COMMITTEE.

Mr. J. W. Stather reports :—For obvious reasons, a complete report, with details of measurements, is impossible this year.

WHITBY.—Mr. J. T. Sewell reports a large fall of cliff at Whitby in the neighbourhood of the East cliff.

BEMPTON.—In June this year, there was a fall of cliff in the neighbourhood of Bempton, said to be the largest within living memory. See *The Naturalist*, July 1916, page 240.

HOLDERNESS.—The high tides of September made considerable inroads into the cliffs immediately south of Bridlington, also at Kilnsea, and other places on the Holderness coast.

THE AFFILIATED SOCIETIES now number thirty-four, having a total membership of 2669. The Brighouse, Lindley and North Eastern Railway Naturalists' Societies have resigned.

THE MEMBERSHIP OF THE UNION at the close of 1915 (exclusive of the Affiliated Societies) numbered 359. The resignations, deaths and names struck off the roll total 30, leaving the membership at 337. The following members were elected during the year, viz :—

Mr. Edward Bilton, 81 Abbey Street, Hull.
Mr. Matthias Bywater, 64 Park Road, Low Moor, Bradford.
Mr. F. Croft, Bank House, Leyburn, S.O.
Sir William Garforth, Syndale Hall, near Pontefract.
Mr. Sam Longbottom, 24 Knight Street, Bingley.
Mr. M. Odling, M.A., B.Sc., F.G.S., the University, Leeds.
Miss E. E. Rushworth, 16 Westfield Place, Halifax.
Mr. Hubert A. Todd, 6 Queen's Road, Linthorpe, Middlesbrough.

SOPPITT MEMORIAL LIBRARY.—Few additions have been been made during the year, but we have pleasure in acknowledging the following :—" The Study of Diptera " and ' Diptera Scotica, VI.—The Western Isles,' by Mr. Percy F. Grimshaw ; ' Ecology of the Purple Heath Grass (*Molinia cærulea*) ' and ' The Vegetative Anatomy of *Molinia cærulea* ,'by the Rev. T. A Jefferies ; the Transactions and Annual Report for 1915-1916, of the North Staffordshire Field Club, and ' Morphology and Development of *Agaricus rodmani*,' by Prof. G. F. Atkinson.

BRITISH ASSOCIATION.—The Yorkshire Naturalists' Union was officially represented at the meeting of the British Association at Newcastle, by Mr. T. Sheppard, M.Sc., who had the honour of being elected the vice-president of the Conference of Delegates. A detailed report of the meeting was given in *The Naturalist* for October, pp. 305-323.

' THE NATURALIST ' has well maintained its reputation as a high-class scientific journal, and the Editors are to be congratulated on the maintenance of the standard of efficiency of the Union's Journal.

THE PRESIDENCY for 1917 has been offered to and accepted by Sir Archibald Geikie, O.M., K.C.B., LL.D.

THE UNION wishes to record its indebtedness to its retiring President, Mr. W. N. Cheesman, J.P., F.L.S., of Selby, for his services during the year, and for his attendances at the excursions and sectional gatherings, all of which have been greatly appreciated.

FINANCIAL STATEMENT.—The following is the Hon. Treasurer's (Mr. Edwin Hawkesworth) statement of Receipts and Payments :—

STATEMENT OF INCOME AND EXPENDITURE,

12 months to November 14, 1916.

INCOME.

	£	s.	d.	£	s.	d.
Members' Annual Subscriptions, arrears	6	15	6			
,, 1916	87	3	4			
,, 1917	1	2	0			
				95	0	10
Levies from Associated Societies, arrears	1	7	11			
,, 1916	10	3	10			
				11	11	9
Life Members' Subscriptions (*contra*)				7	7	0
Sales of Publications				0	2	0
Bank Interest				3	13	2
'Naturalist'—	£	s.	d.			
Subscriptions, arrears	5	15	0			
,, 1916	75	10	0			
,, 1917	1	0	0			
	82	5	0			
Discounts	2	12	7			
				84	17	7
				£202	12	4

EXPENDITURE.

	£	s.	d.	£	s.	d.
Expenses of Meetings				7	13	2
Printing and Stationery (General A/c)				19	2	8
Postages, etc. (Hon. Secretaries' A/c)				12	9	10
Clerkage, ,, ,,				10	0	0
Stationery, etc. (Hon. Treasurer's A/c)				1	8	0
Postages etc., ,,				1	8	9
Life Members' Account (*contra*) ..				7	7	0
Cost of Publications:—						
Annual Report, 1915 ..	£6	15	0			
,, ,, 1916 (est.)	6	15	0			
	13	10	0			
Less—Provision in A/cs for 1915	6	0	0			
				7	10	0
'Naturalist'						
Subscribers' Copies	£106	13	8			
Exchanges	3	12	0			
Sundries	1	6	2			
Editor's Postages, etc.	8	17	5			
Extra pages	6	10	0			
Binding	0	15	9			
				127	15	0
Balance, being excess of Income over Expenditure during 1916				7	17	11
				£202	12	4

BALANCE SHEET, November 14, 1916.

LIABILITIES.

	£	s	d.
Amounts due from Union—			
'Naturalist'	66	2	7
Annual Report, 1916	6	15	0
Subscriptions received in advance..	2	2	0
Life Members' Account	74	19	0
'Hey' Legacy Account	20	0	0
Balance, being excess of Assets over Liabilities, Nov. 14th, 1916 ..	77	5	2
	£247	3	9

ASSETS.

	£	s.	d.	£	s.	d.
Cash at Bank	235	3	8			
Cash in Hon. Secretary's hands..	4	11	4			
Cash in Hon. Treasurer's hands..	0	13	4			
	240	8	4			
Less : Cash due to Hon. Editor..	3	4	7			
				237	3	9
Subscriptions in Arrears..	14	19	0			
Less Amount estimated as unrealisable ..	4	19	0			
				10	0	0
				£247	3	9

Audited and found correct,
Nov. 24th, 1916.

WALTER GARSTANG,
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FEB. 1917. No. 721
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A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

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THE MUSEUMS, HULL;
AND
T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
TECHNICAL COLLEGE, HUDDERSFIELD.
WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
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Prof. P. F. KENDALL, M.Sc., F.G.S., JOHN W. TAYLOR, M.Sc.,
RILEY FORTUNE, F.Z.S.

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YORKSHIRE NATURALISTS' UNION: VERTEBRATE SECTION.

President—PROF. W. GARSTANG, M.A., D.Sc.

The February meetings will be held on Saturday, the 17th, in the PHILOSOPHICAL HALL, Leeds (close to the City Square), at 3-15 and 6-30 p.m. respectively.

BUSINESS.

Report of the Birds and Eggs Protection Committee, and discussion on any matter relating thereto.

Short papers (some illustrated by lantern slides and specimens), have been promised, including one by the President on 'Notes on Nestlings and on the peculiarities of Nestling Plumage.'

Mr. H. B. Booth will introduce a discussion on—Why do the different Species of Birds vary so much in the number of the Eggs they lay?

A cordial invitation is extended to any member or associate to present notes on original observations, exhibit photographs, lantern slides or specimens.

The Museum will be open to persons attending.

It is urgently desired that all who can will make an effort to be present and contribute to the success of the gathering.

Further particulars from WALTER GREAVES, Hon. Sec.,
1 Chapel Avenue, Hebden Bridge.

SUBSCRIPTIONS.—Subscriptions to the Yorkshire Naturalists' Union are due on January 1st, and should be sent to the Treasurer, Mr. E. Hawkesworth, Sunnyside, Crossgates, Leeds.

BOOKS WANTED.

Proc. Bristol Naturalists' Society. All before 1874.
Trans. Woolhope Club. 1866-80; 1898-9.
Quarterly Journal of Science. Vols. XV., XVI., XIX., XX., XXII.
Trans. Geol. Soc., London, 4to. 2nd series, Vols. IV.-VII. (1836-56).
Geological Magazine, 1890-1-2-4.
Mackie's Geol. and Nat. Hist. Repository. Vols. II., III.
Proc. Liverpool Geol. Association. Parts 1, 3, 7, 16.
Journ. Northants. Field Club. Vols. IX.-X.
Reliquary (Jewett's 8ov. Series). Vols. X., XII., XV., XVI, XVIII., XXII., XXIV and XXVI.
Irish Naturalist. Vols. 1912-16.
Chester Arch. and Hist. Soc. Vols. V.-IX.
Yorks. Arch. Journal. Parts 63, 69.
Scottish Naturalist. 1881-95.
Annals of Scottish Nat. Hist. 1905-1916.
Walford's Antiquarian Mag. and Bibliographer for 1885.
Proc. London Geol. Soc. Vols. I.-IV. 1826-45.
Quart. Journ. Geol. Soc. Vols. I.-XIV.
Proc. Geol. Assoc. Vol. I. Parts 1-2 (pp. 1-18).
Trans. Yorks. Nat. Union. Part I.
Naturalists' Journal. Vol. I.
W. Smith's New Geological Atlas of England and Wales. 1819-21.
Frizinghall Naturalist. Vol. I., and part 1 of Vol. II. (lithographed).
Illustrated Scientific News. 1902-4. (Set).
Journal Keighley Naturalists' Society. 4to. Part 1.
Cleveland Lit. & Phil. Soc. Trans. Science Section or others.
Proc. Yorks. Nat. Club (York). Set. 1867-70.
Keeping's Handbook to Nat. Hist. Collections. (York Museum).
Huddersfield Arch. and Topog. Society. 4 Reports. (1865-1869).
First Report, Goole Scientific Society.
The Naturalists' Record. Set.
The Natural History Teacher (Huddersfield). Vols. I.-II.
The Economic Naturalist (Huddersfield). Vol. I.
The Naturalists' Guide (Huddersfield). Parts 1-38.
The Naturalists' Almanac (Huddersfield). 1867.
"Ripon Spurs," by Keslington.
Reports on State of Agriculture of Counties (1790-1810).
Early Geological Maps.
Selborne Letters. Vol. I. 1881.

Apply—**Editor, The Museum, Hull.**

JUN 49 1920

NOTES AND COMMENTS.

EXIT 'THE ZOOLOGIST.'

We much regret to read the following in *British Birds* for January :—'The well-known and old-established natural history monthly, *The Zoologist*, having been acquired by the proprietors of *British Birds*, is now incorporated with this magazine. While we welcome this union as an accession to our journal, we can but deplore the cessation as a separate publication of our aforetime contemporary, which has had so long and honourable a career of usefulness. *The Zoologist* was established in 1843 by Edward Newman, who edited it until his death in 1876. From 1877 to 1896 the journal was conducted by Mr. J. E. Harting, and this was no doubt its most flourishing period so far as ornithology is concerned. From 1897 to 1914 Mr. W. L. Distant was Editor, and in 1915 he was succeeded by Mr. Frank Finn.'

BRITISH BIRDS.

'So far as the future of our magazine is concerned, we do not propose to make any serious change in its scope or policy. It will still be devoted entirely to Birds, and it is with regret that we *must exclude from its pages all other branches of Natural History* which found a place in *The Zoologist*. We propose, however, while still specializing in the birds of the British list, slightly to enlarge our scope by admitting a limited number of articles and notes on the avifauna of other parts of the western portion of the Palæarctic Region or, in other words, of Europe and North-west Africa.' From this, it is obvious that *The Zoologist*, which has been such a friend to British naturalists, virtually ceases, especially as *British Birds* does not seem to contain any additional pages. In fact, if anything, it is even smaller, the present number containing only 24 pages, whereas formerly it contained 36 pages; and *The Zoologist* averaged 40 pages per month.

TOWNS OF ROMAN BRITAIN.*

In the first paragraph of this book, we find that the author, who has written on 'Genesis and Evolution of the Individual Soul,' 'The Birth and Growth of Toleration,' 'Wooing and Wedding,' etc., tells us that he writes 'the last line of this book with a sigh at the incompleteness of his work. He is conscious he has touched but the fringe of the mantle covering the form of the silent Muse of History.' We sigh in sympathy with him, and agree with his opinion. When, however, he modestly informs us, 'the present work is intended to furnish a compendious guide to readers who desire to study the fruits

* By the Rev. J. C. Bevan. London: Chapman & Hall, 66 pages, 2s. 6d. net.

of the Roman occupation, to trace out the roads they laid down, and to possess themselves of the position and essential features of the centres where they congregated for commerce, pleasure or defence,' we fear we must admit, as one of the readers, to a considerable feeling of disappointment. The book is a scrappy summary of what is known of Roman Towns; Colchester occupying about half a page, and York only a little more. The author refers to 'the wonderful secrets which await the skilful use of such humble implements as the shovel and the pick in almost any quarter of our island home.' We could put him on several square miles of our island, in different parts, where he could spend the rest of his days with the shovel and the pick; but he would find few 'hidden secrets,' though he might produce a new treatise on 'Toleration'! As the book is not bound in cloth, the price at 2s. 6d. seems ample.

THE 'COUNTY' MANIA IN IRELAND.

In *The Irish Naturalist* for January, Mr. Roland Southern writes on 'The State of Ireland,' in which he refers to the present 'county mania' with regard to recording species. He points out that 'the seaward boundary of the terrestrial divisions was fixed at low-water mark. Consequently, one shore of nine of the principal bays was in one sub-province down to low water-mark, and in another sub-province below low-water mark. One might catch a crab just above low-water mark in 'Desmond,' but if the crab was nimble enough, and managed to slip into the water before being captured, it would figure in the records of 'Thomond.' If that crab had been already recorded from 'Desmond,' but not from 'Thomond,' there would be a strong temptation for the record hunter to chivy it over the border before capturing. But such deplorable chicanery could not have occurred to the mind of Mr. Adams, for he says 'Species obtained by shore-collecting belong (naturally enough) to the county on whose shores they are collected.' Nor, apparently, have the vagaries of 'low-water mark,' as a territorial boundary, troubled him.'

'But these minor absurdities do not constitute the chief objection to such ready-made faunistic and floristic divisions of a country. They are fundamentally wrong, insomuch as they precede a knowledge of distribution, instead of being based on it. If they are to have any value, they must represent the observed limitations of species, and those factors in the environment which prevent their further dispersal. It will then be obvious (as it is now) that each species has its own peculiar distribution, and only two divisions will be necessary to express it, one in which it occurs, and one from which it is absent.'

Naturalist,

SPOONS.

In his speech at a meeting held in connection with the future Craft Museums recently, Dr. W. Evans Hoyle, who is apparently an authority on the subject, states 'I am a representative of one of those small nationalities in which we are supposed to be feeling a special interest just now. In Wales, in times not so far back, many of these home industries were habitually practised: it was the fashion for a young man to present the girl he was courting with a spoon, the handle of which was elaborately carved. Often the handle was fearfully and wonderfully made and of such dimensions as to render the object quite useless, especially when, with touching significance, two bowls were attached to one handle. I do not know whether this practice is the origin of the expression "being spoony" on a girl, but it is not so far-fetched as some etymologies that one comes across. Such objects as these and many similar ones are relics of a time before facilities of travel and picture palaces had drawn people away from the pursuit of fireside handicrafts.'

SALES FROM THE NATIONAL GALLERY.

The Council of the Museums Association, through Mr. E. Rimbault Dibdin, the president, and Mr. E. E. Lowe, the secretary, have written to the Trustees and Director of the National Gallery to record their appreciation of that part of the National Gallery Bill, 1916, which proposes to allow loans to colonial galleries, and some extension of the facilities for the loan of pictures and works of art to provincial galleries. With regard to the sale of works of art by the National Gallery Trustees, the council ask that, in the event of the Bill becoming law, sympathetic consideration should be given to the needs of provincial and colonial galleries before any work be sold. They further submit that it would be desirable to have an expert independant advisory tribunal to examine and confer with the Trustees and Director in regard to works to be sold or exchanged, and that any legislation designed to restrict the exportation of certain classes of paintings, etc., should apply to all works falling into those classes, and not be restricted to those specified on a list prepared by or for the Trustees of the National Gallery.

CARBONIFEROUS CORALS.

At a recent meeting of the London Geological Society, Dr. Stanley Smith read a paper on '*Aulina rotiformis*, gen. et sp. nov., *Philipsastræa hennahi* (Lonsdale), and the genus *Orionastræa*.'. The primary object of the present communication is a description of a new and interesting coral genus of colonial habit, *Aulina*, obtained from the highest limestone that can be associated with the lower Carboniferous—the

Fell Top Limestone of Northumberland and its equivalent horizon in Teesdale, the Botany Beds. Since this form has been confounded with another Carboniferous species, well known under the name of '*Phillipsastræa radiata* (S. Woodward),' it has been found advisable, in fact necessary, to extend the original scope of the paper so as to include a revision of the genus *Phillipsastræa* and a description of '*Ph. radiata*' and its allies, which he has grouped together under a new generic name, *Orionastræa*. Several type-specimens, including that of *Phillipsastræa hennahi* (the genotype of *Phillipsastræa*), are described and figured. The new genus from the Fell Top Limestone is a very distinctive form, on account of the remarkable annular wall developed within the theca, and may prove of considerable value as a zonal index. The corallum in this genus, as also in *Phillipsastræa* and in *Orionastræa*, represents a stage in colonial development in which the epitheca of the individual corallites has entirely disappeared, and these are consequently united by their dissepimental tissue— a type of colony to which the term 'Astræiform' may be applied.

DIAGNOSES.

Aulina rotiformis.—The corallum is massive, and the corallites are united by their extrathecal tissue; all the septa dilate at the theca, and those of the major cycle again dilate at their axial edges, in such a manner as to fuse together, and so build a cylindrical wall or tube within the theca. The structure of the form is in most respects similar to that of *Phillipsastræa*, but it appears to carry forward the septal characters peculiar to that genus to a further stage of development.

Phillipsastræa.—The corallum is composite and massive; the corallites are united by their dissepiments, or are only separated by a thin epitheca; in the former case, the septa are often confluent. Major and minor septa dilate at the theca; the latter terminate there, and the major septa attenuate and advance into the intrathecal region, and there often dilate again at the axial edge. The central part of the corallite is occupied solely by tabulæ.

Orionastræa.—The characters of this genus are essentially those of *Lithostrotion*, but of a modified form. The corallum is composite and massive, and the corallites are either defined by a thin epitheca, or, in the more typical instances, by no epitheca at all; in this latter case, the corallites are united by their dissepiments and the septa are confluent.

The distinguishing characters of the three species recognized and described are as follows:—

1. *O. ensifer* (Edwards & Haime). Septa not confluent. Culumella present.
2. *O. phillipsi* (McCoy).....Septa confluent. Culumella present.
3. *O. placenta* (McCoy).....Septa confluent. Culumella absent.

DISCUSSION.

Professor E. J. Garwood quite agreed that the form, generally known as '*Phillipsastræa*' *radiata*, which occurs in the Botany Beds in Yorkshire and also in the Fell Top Limestone of Northumberland, was a distinct form apparently limited to a high horizon in the Yorkshire beds, and he had himself used it as a zonal index for this horizon. He pointed out that at Botany, the beds still contain abundant examples of Dibunophyllids and other well-known marine Lower Carboniferous forms, although they occur some 200 feet above the base of the Millstone Grit Series of the Geological Survey maps. It was obvious, therefore, that, however useful it might be for economic purposes to represent the arenaceous occurrences by a special colour, this sandy episode entered in different districts at different periods, and could not be used as a definite stratigraphical horizon dividing the Lower and Upper Carboniferous rocks.

FACETTED PEBBLES FROM LANCASHIRE.

At the same meeting, Mr. J. W. Jackson exhibited a number of facetted pebbles from Pendleton (Lancashire), and stated that nearly 200 of these had been collected during the last six months from near the top of a section of current-bedded and faulted Glacial Sand and Gravel at an altitude of about 200 feet O.D. The pebbles occur *in situ* some 2 or 3 feet below the capping of darker subsoil, which contains cores and flakes of flint, including pigmies. They consist of slate, granites (Eskdale and Shap), Ennerdale granophyre, Borrowdale volcanic tuffs, porphyries, quartzites, Millstone Grit, sandstones, Chalk flints, Carboniferous chert, and other rocks. The largest facetted pebble measures $11\frac{1}{2} \times 8\frac{1}{4}$ inches, and is 7 inches high; the smallest is only half an inch in diameter. The facets are generally concave, grooved, or fluted. They vary in number: some stones have one facet only, others two or more. One stone with a flat top shows five incipient facets. On some, the grooving is of the nature of parallel series of elongated pits.

DIFFERENTIATION.

Differentiation, according to varying hardness and composition, is well displayed on the granites, porphyries, grits, etc., where the weaker constituents have been strongly eroded, leaving the stones with an irregularly pitted surface. The production of facets by splitting along joint-planes is seen on some examples of sandstone; but the facet thus formed has been modified by wind-action. A few pebbles occurred in the sand completely inverted, and some show distinct facetting on both sides. Of examples orientated *in situ*, the facets faced north-westwards, westwards, and south-west-

wards—the directions of the present prevailing winds. All the pebbles are of Glacial origin, but the facetting may be relatively quite recent. The upper part of the sands where they occur may be the result of redistribution by wind before a soil-cap began to form.

THE BELEMNITE.

At a recent meeting of the London Geological Society, Mr. G. C. Crick, A.R.S.M., F.G.S., gave an account of some recent researches on the belemnite animal. He stated that it was his intention to confine himself to the restoration of a typical belemnite animal and its shell, as shown particularly by examples in the British-Museum collection. He first demonstrated, by means of a rough model, the construction of the belemnite shell, including the guard or rostrum, the phragmocone with its ventrally-situated siphuncle, and its thin envelope the conotheca, with its forward prolongation and expansion (on the dorsal side) known as the pro-ostracum. He then noted the abrupt termination of the chambered cone on the lower part of the pro-ostracum, of which the dorsal surface may have been partly or almost completely covered by a thin forward extension of the guard. To illustrate what was known of the complete body of the animal as found associated with the guard, he showed photographic slides of two of the examples figured by Huxley in his 'Memoir on the Structure of the Belemnitidæ,' published in 1864. Each of these exhibited the guard associated with portions of the pro-ostracum, the ink-bag, and the hooklets of the arms. The form of the hooklets with their thickened bases was discussed, this feature in a great measure justifying the attribution to the belemnite of certain cephalopod remains (found practically at about the same geological horizon) that included uncinated arms associated with an ink-bag, and frequently also with nacreous portions of (presumably) the pro-ostracum.

LIAS SPECIMENS.

Of the remains of uncinated armed cephalopods from the Lias, each exhibiting the same form of hooklets as those figured by Huxley, he said that the British-Museum collection contained seventeen examples, all from the neighbourhood of Lyme Regis and of Charmouth, in Dorset. Each specimen exhibits a number of uncinated arms associated usually with an ink-bag, sometimes also with nacreous matter, and in two instances also with the guard or rostrum. These two examples were those to which he had already referred as having been figured by Huxley, and unfortunately the arms are not well preserved in either of these specimens; in one (*B. bruguierianus*, from the Lower Lias near Charmouth) there are only a few scattered hooklets, while the arms of the other (*B. clongatus*,

from the Lower Lias of Charmouth) are represented only by a confused mass of hooklets. Of the other fifteen examples, in one there are a few solitary hooklets ; in another the number of the arms is very indistinct ; in two the remains of only two arms are preserved ; in one there are traces of three arms ; in two there are indications of three, or possibly four, arms ; and in one there is a confused mass of possibly four arms ; and in one there are the remains of four, or possibly of five, arms. In each of the remaining six specimens six arms can be more or less clearly made out, while there is not a single example in which more than six uncinated arms are displayed.

TENTACLES OF BELEMNITES.

Of the six examples that exhibit six uncinated arms four are stated to be from the Lias of Lyme Regis ; one is from the Lias of Charmouth ; and one was obtained from the Lower Liassic shales between Charmouth and Lyme Regis. From a consideration of these specimens, the speaker concluded that the cephalopod represented by these uncinated arms is the animal known as the belemnite, and that the six uncinated arms were arranged in three pairs of unequal length, of which the longest pair was lateral, the medium sized pair probably dorsal, and the shortest pair probably ventral. He considered the presence of tentacular arms to be doubtful. These observations were in accord with those of Huxley, who, in his ' Memoir ' already cited, stated that he had ' not been able to make out more than six or seven arms in any specimen, nor has any exhibited traces of elongated tentacula, though the shortness of the arms which have been preserved would have led one to suspect their existence.' The speaker regarded certain markings sometimes to be seen on the guard as indicating that during the life of the animal the guard was almost, if not entirely, covered by the mantle, in which case it was highly improbable that the guard was pushed into the soft mud of the sea-bottom in order to act as an anchor. He considered the animal to have been a free swimmer, swimming forward ordinarily, but when desirable, capable also of sudden and rapid propulsion backwards.

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The Entomologist for January contains a paper on ' Two Days' Collecting in Lancashire and Cumberland.'

Animal World for January contains a paper on ' The Jelly Animals,' by Evelyn Cheesman, and also one on ' Oxen Ploughing-Teams in the Past and Present,' by Harwood Brierley.

Wild Life for December has a paper on ' The Sheld-duck,' by C. R. Brown, which is illustrated by a remarkable series of photographs, some, which are tinted on coloured mounts, being perfect. Mr. O. J. Wilkinson writes on ' At Home with the Reed Warbler,' which is also well illustrated, and there are other items of particular interest to the naturalist.

NORWEGIAN BOULDER IN THE MILLSTONE GRIT OF YORKSHIRE.

A. GILLIGAN, B.Sc.,, F.G.S.
Leeds.

AMONG a remarkable suite of pebbles which the author has obtained from the Millstone Grit series of Yorkshire occurs one which has a striking resemblance in the hand specimen to the well-known rhomb-porphyry of the Christiania district which is so abundant in the Glacial deposits of E. Yorkshire. The pebble when first obtained was roughly ellipsoidal in

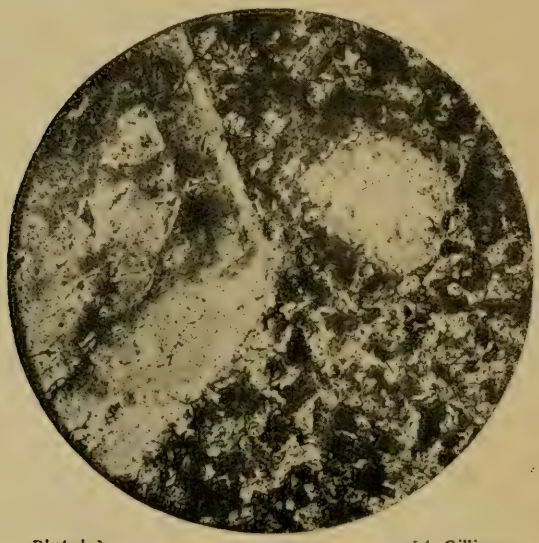

Photo by] [*A. Gilligan.*

Showing obtuse angle of one of the large felspar crystals, and fine-grained groundmass. × 20.

form, the axes measuring $5 \times 2\frac{1}{2} \times 2$ inches. The broken surface is lighter in colour than the common type of rhomb-porphyry.

Under the microscope, it shows the following characters. The groundmass is rather fine grained, and is made up of felspar (microperthite), with rather abundant quartz. The accessory minerals are sphene, zircon and apatite, but these occur very sparingly. The phenocrysts are probably anorthoclase, but are so decomposed that definite determination is impossible.

The specimen and section have been submitted to Prof. Brögger of Christiania, who writes as follows :—'The rock is not a rhomb-porphyry. It is, however, possible that it belongs to the alkaline series of eruptive rocks of the Christiania

Region, the total destruction of the dark non-felspathic silicate forbids one deciding this question.'

Referring to the structure of the rock, he further writes :— 'The structure resembles some "Ekerite-porphyries" from the Christiania Region, and it is thus possible that this rock may be an altered "Ekerite-porphyry" from Norway.' It does not, however, agree with any of the ten thousand specimens of alkaline rocks from the Christiania Region in the museum under the direction of Prof. Brögger.

While then a Scandinavian source cannot be definitely assigned to this rock, it is so unlike any British rock with which the author is acquainted, that he is disposed to think that it may have been derived from some Scandinavian mass

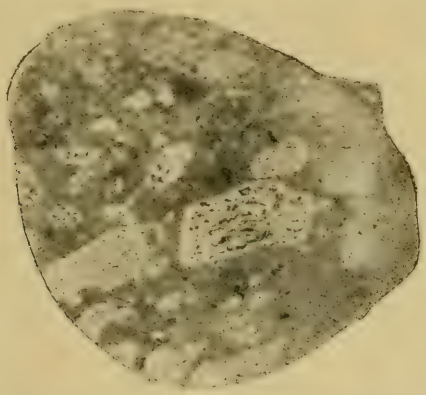

Photo by] [*R. Simpson.*

Polished surface of Pebble.
Natural size.

which has long since disappeared. The age of the eruptions which yielded the rhomb porphyry of Christiania, is Devonian, the same as the Shap Granite, so that the specimen here described may have been yielded by the denudation of the erupted masses. In a similar way, pebbles of the Shap Granite, which, of course, never reached the surface until exposed by denudation, are found in the Carboniferous basal conglomerate in the neighbourhood of Tebay.

The only other areas where rocks of the rhomb-porphyry type are known to occur are Mts. Kilima Njaro and Kenya, East Africa ; and in the neighbourhoood of Mt. Erebus in Antarctica.

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Prof. W. G. Fearnside's paper on 'Refractory Materials in South Yorkshire,' read to the Midland Institute of Mining, etc., Engineers, appears in *The Quarry* for January.

ICHTHYOLOGICAL NOTES FROM THE SCARBOROUGH DISTRICT, 1915-1916.

W. J. CLARKE, F.Z.S.

Owing to the restrictions upon the movements of fishing vessels, due to the war, and also to the greatly reduced number of boats now engaged, there has not been during the past two years so many opportunities for seeing uncommon fishes, which have been caught in the trawls or upon the fishermen's lines. In Marine fishes, the following species, however, have been noted :—

Three-bearded Rockling (*Motella mustela*).—Although resident, this species is not very often seen at Scarborough, and is sufficiently scarce to be an object of curiosity to the fishermen when caught. A specimen, 16 inches in length, was picked up dead, but perfectly fresh, in Burniston Bay, a couple of miles north of Scarborough, on November 28th, 1915.

Pilchard (*Clupea pilchardus*).—The Pilchard is said to be a casual visitor in summer, sometimes in numbers, to the Yorkshire coast, but for many years I have sought for it in vain. Enquiries amongst the fishermen and others engaged in the fish trade, led me to the conclusion that the occurrence of this species at Scarborough, is very uncommon. Only one man professed to have ever seen one, and on asking him how he distinguished the fish from a Herring, he replied that it was quite easy, as the Pilchard has its scales the ' wrong way on,' *i.e.*, pointing from the tail to the head, which, of course, is absurd. Hence I was very pleased on finding amongst half-a-dozen herrings, purchased from a street hawker on August 9th, 1916, a fine full-grown Pilchard. Enquiries from the man showed that the fish had come from a boat fishing out of Scarborough, and had been landed that morning. As at that time the boats were restricted to fishing within a very small area from port, there is no doubt that this specimen was caught very near to Scarborough. An examination of the man's stock-in-trade did not reveal further specimens, and it remains the only Yorkshire example I have seen.

Short Sunfish (*Orthagoriscus mola*).—It is seldom that a summer passes without a specimen of this singular fish being captured somewhere in Yorkshire waters, and it is, during the warm months, probably of more common occurrence than is generally supposed. An example, weighing 20 lbs., was captured by Mr. M. Jenkinson, two miles from shore off the South Bay, Scarborough, on October 2nd, 1916. These wanderers are generally either cast ashore in rough water, or entangled in the herring nets, but I have a note of one captured near the East Pier, Scarborough, on August 17th, 1901, which took the piece of squid used as bait upon a mackerel line.

Porbeagle Shark (*Lamna cornubica*).—This Shark is a regular and not uncommon visitor to Yorkshire waters during the warm months, and although during the past two years fewer examples have been landed, that is solely due to the smaller number of vessels engaged in the herring fishery, and to the fact that they have fished closer inshore. The specimens seen during 1915 and 1916, indicate that there has been no falling off in the numbers of this fish which have visited our coast. Most of the examples range from 4½ to 6 feet in length, and seldom exceed the latter, although I have a note of one stranded in Burniston Bay on March 3rd, 1911, which measured 8½ feet.

Picked Dogfish (*Acanthias vulgaris*).—This destructive species has for several years past been exceptionally numerous off Scarborough, and great numbers of them have been landed by the trawlers and herringers. Formerly thrown away as worthless, they have of late years gradually increased in favour as an article of food, being skinned and sold as 'deep sea Gurnards.' Among the smaller species, a few Tope (*Galeus canis*) can generally be seen, and they also are now sold as food.

In Freshwater fishes, the following records are of interest :—

Planer's Lamprey (*Petromyzon planeri*).—An adult seen swimming in the Derwent at Forge Valley on May 14th, 1915, was captured and is now in the Scarborough Museum. This species seems to make its way up the higher reaches of the Derwent annually during the months of April and May. On June 19th, 1915, an Ammocete, or larva of this species came, in a much bruised and battered condition, but still alive, through a water tap in Scarborough, having, no doubt, originally come from the Derwent at Ayton, whence a portion of the local water supply is derived.

River Lamprey (*Petromyzon fluviatilis*).—This species commonly ascends Scalby Beck in numbers from the sea, but I had never seen it in the Derwent until, on October 22nd, 1915, while engaged in emptying an artificial pond used for rearing young trout, I found in the pond a specimen of this species. It had, no doubt, passed in with the water supply from the Derwent in Forge Valley and was unable to make its way out again.

The Scarborough district is not famous for the 'Specimen' fish caught in its streams, and those mentioned hereafter, are doubtless not very exceptional for many districts, but they are of considerably greater development than the average specimen caught in our part of the county.

Roach (*Leuciscus rutilus*).—One weighing 2lbs., 4oz., was taken by Mr. D. Davy in the Derwent at Yedingham Bridge.*

* A Roach of 2lbs. or over is a notable fish anywhere.—R.F.

Common Trout (*Salmo fario*).—Trout weighing 3lbs. 12½oz., and 3lbs., were captured during the season of 1916 in the preserved water of the Derwent Anglers' Club at Forge Valley and Hackness. One weighing 5lbs. 4oz., was caught in the stream at Thornton Dale by Mr. W. T. Garbutt on July 4th, 1916. When in process of preservation, this fish was found to have in its stomach a young kitten about three weeks old.

Tench (*Tinca vulgaris*).—A specimen weighing 4 lbs. was taken, during the summer of 1915, from the Seamer Mere by Mr. G. A. Milner. This fine fish was unfortunately not preserved.

Chub (*Leuciscus cephalus*).—An exceptionally fine specimen weighing 6lbs., 3oz., was caught during the early autumn by Mr. Moseley, in the Derwent between Scarborough and Malton.

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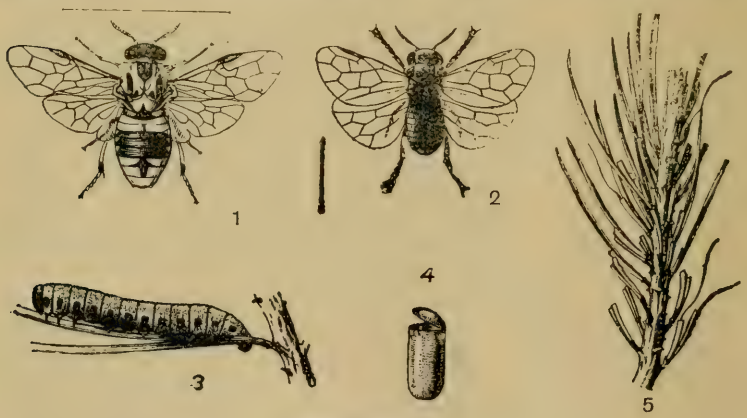
Insect Enemies. By **C. A. Ealand.** London : Grant Richards, 223 pp., 6s. net. The sub-title to this volume defines its scope :—'enumerating the life histories and destructive habits of a number of important British



Insect Enemies.

Pine Saw-fly, *Lophyrus pini* L. 1. Male; 2. Female; 3. Larva; 4. Pupa; 5. Twig damaged by the larvæ.

injurious insects. Together with descriptions enabling them to be recognised, and methods by means of which they may be held in check.' Mr. Ealand departs from the usual plan of a book on insects, and instead of praising the beauties of the moths, beetles, flies, mites, etc., he shows in no hesitating way how harmful many of them are. He deals with them under the heads of pests of the Forest, of Fruit Trees, of Flowers, of Vegetables, or Crops, of Domestic Animals, of the Household, of Warehouses, and of man. He is much indebted to the Board of Agriculture and Fisheries, whose leaflets, dealing with similar subjects, are well known. There are numerous illustrations, the nature of which can be gathered from the specimen which we are enabled to reproduce herewith.

ON ARRANGING MUSEUM CASES FOR BIRDS.

T. SHEPPARD, M.Sc., F.G.S.

It would be a great advantage to everybody if taxidermists would adopt some definite plan for the cases they make. At present there seems to be no system whatever. A bird, taken to the average 'stuffer,' is inserted in a wooden box, the height, depth and width of which varies according to the taxidermist's idea, or lack of idea, or according to the size of a particular board he may have in stock. In addition, the 'decoration' of the case depends, as a rule, upon the odds and ends that happen to be in his den; thus the glass may be edged with coloured paper, a strip of gold picture-framing, mahogany, or may be left black. This system, or lack of system, certainly lends variety; but when a number of such cases are brought together, the result reminds one of the patch-work quilts in which our grandmothers used to take such pride. In visiting a collection of local birds in a small Yorkshire Museum a little while ago, this need for uniformity was especially apparent. Most of the cases certainly were edged with black, but the mixture of mahogany, gold strips, etc., suggested that a good supply of black paint would do much to create harmony. In addition, the irregular shapes of the cases made the grouping exceedingly irregular, so that the top was castellated, and in the distance represented the appearance of some ruined castle wall.

Another fault is the want of method in decoration. Sometimes a case is painted or papered throughout with a monotonous grey, light brown, blue, or even yellow colour. If they are all alike, the effect is not so bad, especially if the colour is a good light blue. But usually they are not. Then the average 'stuffer' delights in perching his bird on a composition twig, wrapped with faked lichen, with here and there a little sheaf of 'trembling-grass,' or other vegetal monstrosity. The 'back-ground' is decorated by a pair of butterflies in impossible attitudes, or, if the specimen happens to be a shore-bird, the foreground is glued over with absurd pieces of sea-weed, coralline, and varnished mussels, cockles, periwinkles and whelks. At times, the amateur hand tries to play the part of Nature, and the back of the case is painted with volcanoes, crags, lakes, etc., which certainly at times is advantageous, as it takes the eye away from the specimen itself, which, if 'a neagle or a nawk or a nowl,' or worse still, a bittern, usually looks at the visitor with a forbidding and wooden stare from its usually too-large black eyes.

On the question of the postures of the birds, however, it is not now proposed to speak. The inexperienced but cheap

'stuffer' can only caricature nature's feathered beauties, and many of our most charming birds are destined to haunt us like a feather-be-decked gargoyle, until that grand day arrives when the moth and rust doth corrupt, or, what would truly be a god-send, when the thieves break through and steal; though usually thieves are not sufficiently imbecile to take sawdust- or 'tow'-stuffed birds.

Why cannot taxidermists adopt some definite scale for their cases? A foot—the ordinary twelve-inch foot—should be a good basis, the measurement to be of the *outside* of the case. Thus, a case for an average-sized small bird could be a foot square, or a foot high by 1½ feet broad. Slightly larger birds could be in cases 18 inches square, or 18 inches by 2 feet. Larger sizes of 2 feet, 2½ feet, 3 feet, and so on, could be adopted. In this way, no matter how large a collection grows, the cases can be easily arranged together, and can be finished off in a straight line at the top, bottom and sides. By adopting some such definite series of measurements for a case, a few inches extra can always be given, with advantage to the exhibit. When the beak, top of the head, tail and feet respectively almost touch the four sides of the case, (as for instance, the Bustard in the middle of the bottom row of fig 1), the most likely impression made on the mind of a juvenile visitor is that the curator is trying to see how long the bird can remain in its cribbed cabined and confined state before it dies of suffocation! It leaves the same evil thoughts in one's mind that exist when one hears a lark trying to sing in its cage of six or eight inch sides. And museums or private collections should not cause such thoughts.

Some time ago, I had to arrange a large collection of cases of birds; hence these tears. Mr. and Mrs. Wickham Boynton presented to the Hull Museum the enormous collection of British birds formed by the late Sir Henry Boynton, a well-known Yorkshire naturalist. About the same time, we acquired the fine series of Yorkshire-obtained* birds formed by Mr. Riley Fortune, F.Z.S., of Harrogate. We already had the well-known collection of the late Henry J. Robinson Pease. In addition was a typical series such as one finds in the museum of a city like Hull, where specimens had accumulated for three quarters of a century. Among them were some good ones, and several of local interest. There was also the usual assortment one gets about spring-cleaning time, mindful of the old wool-work pictures with which our mothers and aunts whiled away their winter evenings.†

* This sounds better than 'shot.'

† I have one in mind particularly; it shows a wall-eyed sparrow-hawk perching on a well-blooming red rose bush—a thing of beauty and a joy for ever!

This accumulation of collections of cases of birds was almost about sufficient to entirely blot out, if not consume, the entire general collection in the Museum. But, as so often happens with those who get more than they can accommodate, something happened.* The generosity of the Hon. T. R. Ferens, M.P., in presenting a handsome sum to the Corporation of Hull for the purchase of pictures, caused that body to build a new Art Gallery, and the old Art Gallery, consisting of three excellently top-lighted rooms, became vacant. I got it; and in went the birds. And then the trouble began. Then it was that the absurdity and uselessness or lack of method of making bird cases was forced upon me. To have to take several hundred cases, of all sorts and sizes, from those large enough to be made into good sized 'dug-outs,' to others which would suffocate a mouse, and fit them together with a straight line at the bottom and another at the top, and at the same time keep the birds in their natural order, is a Chinese puzzle which once solved is never forgotten Nor was the matter simplified by the fact that one case sometimes contained two or more species of birds which should be as far apart as the size of the rooms would allow.

However, the cases were first placed together in the otherwise empty rooms. Then the duplicates were sorted out, it being unnecessary to state that the best of each species was kept. The rest were carefully cleaned up and made as presentable as possible with a minimum of expense, and 'lent' to the Art School, the Secondary Schools, and several elementary schools in the city. In this way about 250 cases were disposed of, without interfering with the value of the collection remaining; in fact the loss was an improvement. It is sincerely to be hoped that these cases may do a little towards creating an interest in birds among our young people, and thus counteract, to some extent, the effect of the Wild Birds, etc. Protection Acts, which, admirable and necessary though they are, are not inclined to create ornithologists.

Then the glass had to be removed from each case in turn, in order that the specimens, some of which had been interned for nearly half a century, might receive attention, and in order that birds out of place might be put in something like systematic order; due care, of course, being paid to keep the data of each species. This alone gave an insight into the methods of taxidermic glazing. Some of the glass fell out if the back of the case was tapped; other pieces were gummed, glued, papered, screwed and rivetted, and then secured with sprigs and held in position with wood strips. In such instances, it

* See 'Pastimes for Curators,' *Museums Journal*, 1911, and Hull Museums Publication No. 85.

Fig. 1. Original cases for birds, Hull Museum.

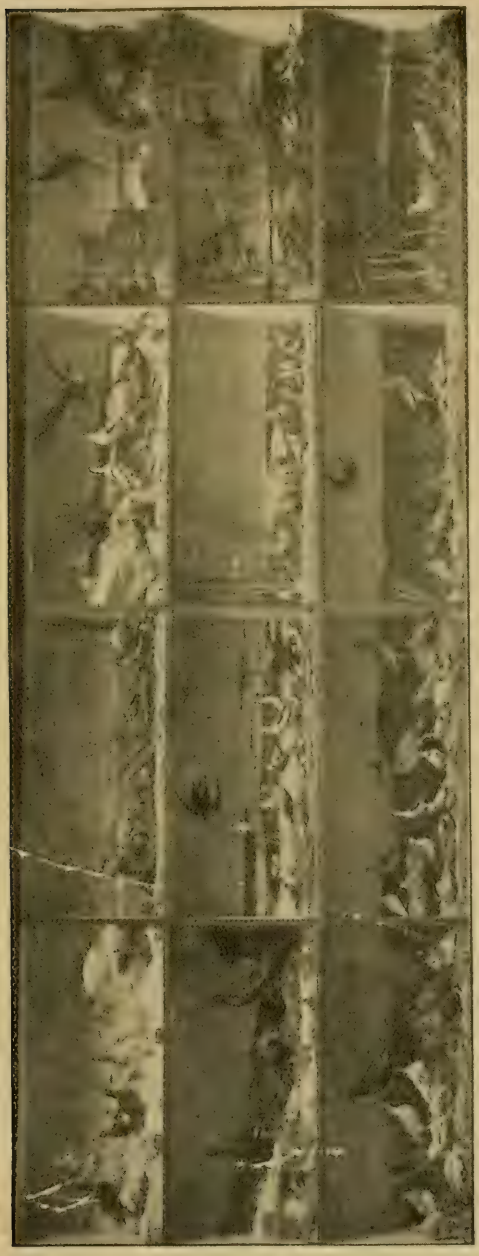


Fig. 2. Cases for bird-groups, as re-arranged, Hull Museum.

was deemed advisable to make an attack in the rear, and remove the backs of the cases. At this stage the services of a competent naturalist-taxidermist, who knew a heron from a handsaw, were requisitioned, and he was kept employed for some months. Fortunately, a good proportion of the cases had been already painted by him, with an Italian sky-blue tint; this was adhered to for the whole collection, and the result is not displeasing. Then all the gold, mahogany and other variously coloured strips were either lost or painted black, the birds were cleaned up, relaxed and remounted where necessary, and stray butterflies and beetles, grasses and artificial flowers, and incongruous mollusca were removed, with one flagrant exception which was kept as an example of how *not* to do it. The cases were then arranged in systematic order and each specimen was carefully numbered, for reference to the full particulars in the catalogue,* and labelled with the common and scientific names of the bird. These labels were placed on the glass inside the case, at the bottom.

The walls of the rooms, which fortunately were not broken by windows, doors, or other nuisances, were then marked off, the bottom line being not too low to be seen without stooping; the top one being not sufficiently high to create a Zeppelin neck; in this respect, the lines formerly occupied by the pictures formed a good guide. To take the weight of the cases, a long narrow table, on squared tapering legs, was built, with a mahogany plinth about 3 inches deep; and at the top a fairly deep, but not too deep, cornice, was placed, the distance from the wall being that of the deepest case; all the fronts of the other cases being brought to the line. This plinth and cornice, giving a horizontal play of about six or seven inches, saved the situation.

The cases, already numbered in their natural order, were then arranged as near their numerical order as was possible, beginning at the left-hand side, next to the entrance, and extending round the four sides of the room. But as two cases were rarely of the same—or even similar size, the scheme devolved into an exercise of ingenuity and patience. As regards height, the space between the top and the bottom of the plinth, and the top and bottom of the cornice, enabled the lines to be kept. If the total height of the three, four, five or more cases was rather more than the average, the bottom case was lowered to the bottom of the plinth, and the top one was inserted well in towards the top of the cornice; and as the bottom of the bottom case was usually 'earth' or 'rock,' and as the top of the top case was

* A Guide to the Birds in the Hull Museum, by T. Sheppard, 122 pages, and 26 plates, 8vo, price 3d.

invariably 'sky,' the artistic eye was not offended, nor was the scientific value of the exhibit impaired. A few inches in height could be gained, if necessary, by inserting thin pieces of wood between the fronts of the cases. These were painted black, in harmony with the front edges of the cases, and were hardly noticeable. But from the way in which this type of case usually recedes from front to back, together with their varying depths, a regular scaffolding of laths and boards was necessary at the back, somewhat resembling the appearance of the underworld behind the Mappin terraces at the Zoo, excepting that in the Museum they cannot be seen, as between the cornice and the wall, there is a covering of matchboarding which keeps out the dust, cigar-ends, waste paper, etc.

As the work proceeded laterally the same scheme of filling in spaces by thin strips of black wood had to be resorted to, as will be seen in Fig. 1.

On the right-hand side of the main room (see *The Naturalist*, December, 1910, Plate XVIII.), the lower three feet was occupied by drawers, containing the collections of birds' eggs, etc. The distance of the front of these from the wall had to be determined by the depth of the drawers, and was rather more than the depth of the cases warranted. The result was, a small space was left between the top of the drawers and the bottom of the bird-cases. This was filled in by representations of various typical sites; thus one section has a typical piece of sandy shingle (real sand and real shingle!) with a painting of Spurn Point at the back. On this beach material, were placed eggs of the Lesser Tern, Ring Plover, and other suitable species, the natural colouring of the eggs illustrating 'protective resemblance.' In another section was a representation of a section of the famous Bempton cliffs, with a chalk ledge (not real chalk, as real chalk didn't look 'real') upon which were eggs and young of the Guillemot, Razorbill and Puffin. There was a typical piece of reed-covered ground, with eggs of Redshank, etc.; next a piece of a Yorkshire moor, with eggs of Curlew, Grouse, etc.; then a piece of a tilled field with eggs of the Stone Curlew, from a well-known Yorkshire station; another was a representation of a stream side, with sections showing the nests and eggs of the Sand Martin and Kingfisher, respectively, at the ends of the burrows, and so on. And so we got our house in order.

And then we began all over again, and tried to further improve, and I believe succeeded. The wall at the far end of the large room was first attacked. It so happened that it was the smallest, and contained the Grouse, Ptarmigan, Redshanks, Plovers, Sandpipers, Crakes, Snipe, etc. The part occupied by cases measured 20 feet by 7 feet 3 inches, and, as will be seen from fig. 1, contained no fewer than fifty-seven

different cases, all varying in size and shape not even two being alike. These were all removed, and twelve large cases,* each measuring 5 feet by 2 feet, 5 inches, were made. The contents of the fifty-seven cases were then divided into twelve groups, each being placed in one of the new large cases. Before the birds were placed in, each was painted and arranged to represent the natural surroundings of the particular group. For example, a snow scene takes the Ptarmigan, Red Grouse and Willow-Grouse in winter plumage; moors accommodate the Black Grouse, Red Grouse, Ptarmigan, etc., in summer plumage; an estuary takes the Grey Phalaropes, Godwits, Redshanks, etc.; a sea-shore produces the Ring Dotterel, Avocet, Oyster Catcher, etc. Other cases contain the Sandpipers, etc.; Pallas Sandgrouse, and Stone Curlew, Crakes and Rails; Woodcock and Snipe; and last of all, Partridges and Quails. At the bottom of each case the numbers and names of the birds are given. From every point of view, however, the exhibition is more true to nature, more educational, and therefore more as a museum collection should be. The new arrangement is shown in fig. 2.

Unfortunately, like many other schemes, this one, owing to the war, had to be postponed. But some day it may extend to the rest of the collection.

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At the Annual Meeting of the Yorkshire Numismatic Society, held at Leeds on December 16th, the following officers were elected:—President, Mr. G. L. Shackles; Vice-Presidents, Mr. J. Digby Firth and Mr. J. F. Musham; Hon. Treasurer, Mr. E. Croft; Hon. Secretary, Mr. J. Digby Firth; Editor, Mr. T. Sheppard.

Part 4 of *A Bibliography of British Ornithology* (Macmillian & Co., 6s. net, pages 385-496). The present instalment contains particulars of the life and work of quite a number of Ornithologists familiar to our readers. Among them may be mentioned Beverley R. Morris, F. O. Morris, S. L. Mosley, T. H. Nelson, Edward Newman, Robert Newstead, Charles Oldham, C. J. Patten, Sir Ralph Payne-Gallwey, Edward Peacock and W. P. Pycraft. There are of course, numerous other names.

The Bradford Antiquary, part 19 of the New Series, edited by Dr. J. H. Rowe, has made its appearance. Some notes on the Bolling family, with a good view of Bradford's new Museum, are followed by a paper on 'The Rectory Term,' by Mr. H. F. Killick, which term is evidently going to be a god-send for future Bradford lawyers! Mr. Percival Ross writes on the Roman Road from Ribchester to Low Borrow Bridge near Tebay, and also on the first stage of the Roman Road from Ribchester to York; both are well illustrated. Mr. W. E. Preston writes on 'An Endowment of Thornton Grammar School,' and the part concludes with a further instalment by Mr. T. T. Empsall on 'The Marriage Registers of Bradford.' The Society is to be congratulated on the valuable and local nature of its publication.

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* Of course an ideal arrangement would be for one large case for each species, as in the well-known Booth Museum at Brighton; but wall space and money are not everywhere so plentiful as at Brighton.

ON THE OCCURRENCE OF MANGANESE IN LAND AND FRESH WATER MOLLUSCA.

Prof. A. E. BOYCOTT, M.D., F.R.S., etc.

(*Continued from page 18*).

It is also noticeable that *obvoluta*, typically a beechwood species, does not differ from the other helicids which evidently, as a group, have very little manganese. *B. obscurus* gives the same very high figure, whether from beechwood or from a civilised hedge-bank between a high road and arable country.

That snails eat manganiferous food is evident from the analyses of their excreta—

	In fæces.	In corresponding snails.
Hygromia hispida	2·7	< 0·5
Helix hortensis	2·3	0·4
,, ,,	< 1·7	0·4
Theba cantiana	2·5	0·8
Arion ater	1·8	1·2
,, ,,	0·5	4·4
Cyclostoma elegans	2·9	1·2
Limax agrestis	< 0·7	6·0
Limax maximus	< 0·7	11·7
,, ,,	< 2·5	5·7
Limnæa stagnalis	74·4	7·0

As far as these few results go, they indicate that the amount of manganese in the body is not proportional to the amount in the food.

I fancy, therefore, that two factors are at work. In the first place, there is the tendency for some species to accumulate manganese from almost any surroundings,[1] and in the second place, there is the influence of varying local conditions. The relative import of these two factors can only be determined by detailed investigation in a variety of localities and habitats in different parts of the country; at the moment it certainly appears that the former commonly overides the latter.

For there should be no great difficulty in any snail finding as much manganese as it wants about the world. Manganese in smaller or larger quantities is widely distributed both in animals and plants as well as in inorganic nature.[2] Thus, it

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1 The carnivorous marine gastropod *Sycotypus canaliculatus* accumulates zinc in considerable quantities from almost zincless surroundings (L. B. Mendel and H. C. Bradley, *Amer. J. Physiol.*, XIII. (1905), p. 17, XIV. (1905), p. 313).

2 According to F. W. Clarke (*Data of Geochemistry*, ed. 3, 1916, p. 34), manganese constitutes 8 parts per ten thousand (0·08 per cent.) of all known terrestrial matter, *i.e.* a good deal more than such well-known elements as copper, lead, zinc or arsenic: like some rare elements (*e.g.* gallium) it is widely dispersed.

is found rather abundantly in tea, coffee, tobacco and wine, and in this way passes pretty freely into man ; it is not, however, absorbed, but excreted in the fæces, and is present in human tissues in very small traces[1] ; hence, in our anthropomorphic way, we have given it less attention than it probably deserves. P. Pickard[2] says that it is universally present in all orders of plants, and points out that animals have much less ; fungi and lichens have most and mosses much. P. Q. Keegan[3] notes its occurrence in a number of wild English plants. The occurrence in mammals has been investigated by G. Bertrand and F. Medigreceanu[4] ; the liver generally has most and 0·1 part in ten thousand is a high figure, other tissues showing perhaps only a twentieth of that. The same authors[5] examined a number of invertebrates and note that specially large amounts were found in *Limnæa stagnalis*, *Littorina littorea* and *Pecten jacobæus*, less in *Helix hortensis*, *Unio sinuatus* and half-a-dozen other, marine mollusca. Bertrand[6] has advanced the view that manganese salts play an important part as oxidising ferments, though the idea has not been without objectors[7] ; he also showed that *Aspergillus* will not develop conidia in the absence of manganese.[8] Contino[9] found manganese always present in Italian soils from traces to 0·3 per cent. It is present in traces in many waters, especially mineral waters[10] ; the Buxton thermal water, for example, contains 0·001 in ten thousand, and the mud deposited by it 51 per cent.[11]

The meaning of the prevalence of manganese in plants I would not venture to indicate ; possibly it expresses nothing beyond the fact that the element is universally present in small

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1 E. Maumené *Comptes Rendus*, Vol. XCVIII. (1884), pp. 845, 1056 and 1416 : *Bull Soc. Chim.*, Vol. XLII., p. 305 : see also experiments by Bertrand, *Comptes Rendus*, Vol. CLV. (1912), p. 1556.

2 *Comptes Rendus*, Vol. CXXVI. (1898), p. 1882 : unfortunately no quantitative data are given.

3 *The Naturalist* 1909, p. 430 ; 1910, pp. 177, 321 ; 1911, pp. 222, 418.

4 *Comptes Rendus*, Vol. CLIV. (1912), pp. 941, 1450 ; *Bull. Soc. Chem.* (4) Vol. XI. (1912), p. 857 ; *Ann. Inst. Pasteur*, Vol. XXVI. (1912), p. 1013 ; Vol. XXVII. (1913), p. 1.

5 *Comptes Rendus*, Vol. CLV. (1912), p. 82.

6 *Ann. Agron.*, Vol. XXIII. (1897), p. 285 ; *Comptes Rendus*, Vol. CXXIV. (1897), p. 1355 (see also p. 1349) ; also G. M. Piccinini, *Arch. ital. de Biol.*, Vol. LVIII. (1912), p. 360 ; on its share in the familiar blueing of broken boleti, see *Ann. Inst. Past.*, Vol. XVI. (1902), p. 184.

7 see Oppenheimer, *Handbuch der Biochemie* Suppl., 1913, p. 157.

8 *Comptes Rendus*, Vol. CLII. (1911), p. 225 ; Vol. CLIV. (1912), pp. 381 and 616 ; *Bull. Soc. Chim.*, Vol. X., pp. 212, 347, 400 and 494.

9 *Staz. sperim. agrar. ital.*, Vol. XLIV. (1911), p. 51.

10 F. Jadin and A. Astruc, *Comptes Rendus*, Vol. CLVII. (1913), p. 338 ; see also the analyses of mineral waters in A. Albu and C. Neuberg, *Physiol. u. Path. der Mineralstoffwechsels*, 1906, and *Data of Geochemistry passim.*

11 J. C. Thresh, *Examination of water and water supplies*, ed. 2. 1913, pp. 124, 381 and 409.

amounts in the soil,[1] and its relative absence in the higher animals is in correspondence with their superior selective power. It seems, however, that snails must necessarily take it up in their food, whatever sort of vegetable or animal that may be, and in a certain number of cases it accumulates in them. They do not, on the whole, appear to show any preference for manganiferous food; potatoes, containing very small traces, are eaten readily enough, *Arion hortensis* and *H. rufescens* will climb high into trees to eat apples[2]; *L. stagnalis* will swarm on to a cabbage leaf or a dead frog, while the plants around them contain far more manganese. But I admit that the difference between, *e.g.*, *Buliminus* and *Helicella* may turn out to be due, partly at any rate, to a preference by the former for a cryptogamic diet, though on any diet they would probably maintain their relative positions in the manganese scale.[3] Experimental feeding is the obvious solution; but the basal diet would have to be white of egg, with perhaps a little potato and mammalian muscle, and even this would not be quite innocent of manganese.

I have not been able to find any extensive series of analyses giving the quantity of manganese actually present in different plants, and such analyses might be misleading if, as is probable, the quantity varies much in different localities.[4] A few analyses have been made of local vegetation[5] which gave the following results (parts manganese per ten thousand of plant dried at 100° C.):—

Land Plants.			
Grass	0·6, 0·9, 1·1	Cabbage	0·1, 0·3, 1·0
Urtica	0·7	Lettuce	0·3
Oak (leaves)	5·3	Marrow (leaves)	0·2
Beech (leaves)	10·7, 8·6	Artichoke (leaf)	0·4
Ash (leaves)	< 0·2	Foxglove	1·2
Hedera	0·7	Strawberry	1·0
Lamium album	< 0·08	Dock	0·4
Aethusa	0·6	Potato	nil.
Sisymbrium alliaria	0·6		

1 *cf.* the general occurrence of titanium in plants, C. E. Wait, *J. Amer. Chem. Soc.*, 1896, p. 402; and in mammals, C. Baskerville, ib. Vol. XXI., 1899, p. 1099.

2 E. A. W. Peacock, *The Naturalist*, 1902, p. 139.

3 *Testacella* has less than most slugs; earthworms from my garden gave 0·9 per ten thousand. *Hyalinia* are of course not exclusively, and perhaps only occasionally, carnivorous.

4 F. Jadin and A. Anstruc (*Comptes Rendus*, Vol. CLV. (1912), p. 406) in more than 80 species in 32 families found from 0·014 to 7·6, with a variation from 0·1 to 2·0 in different lots of mistletoe.

5 The currant tea and tobacco both gave 1·9 parts.

Tree Trunk Scrapings		Large Fungi (Agarics).	
Beech, Aldenham, close green	0·6	[2] Beechwood	0·7, <0·05
[1] ,, Hampden ,,	1·5	Hedge bank	0·4
[1] ,, ,, grey lichens	8·2	*Lepiota rhacodes*	0·2
[1] ,, ,, moss	15·8	*Clitocybe* sp.	0·2
Oak, Aldenham, grey-grn.	0·4		

Mosses.	
From stone walls	1·1, 1·2
,, old timber	1·3
,, hedge bank	1·3

Water Plants.			
Potamogeton crispus	1, 6	*Callitriche*	16
P. natans	14, 65	*Myriophyllum*	19
P. densus	4, 5	*Ceratophyllum*	44
P. perfoliatus	7	*Ranunculus*	77
P. lucens	28	*Nymphæa*	26
P. pectinatus	45	*Limnanthemum*	33
Elodea (two loci)	14, 23	Watercress [3]	8
Lemna minor	9		
L. trisulca	72		
Nitella	10	Green slime (streams),	
Chara	4	20,[4] 107, 377,[5] 227	
Moss [6] (floor of culvert)	690	Brown slime (pond)	85
,, *Fontinalis antipyretica*	12	Deposit on *stagnalis* shells [8]	41
		Deposit on *peregra* shells	41

These results show that whatever vegetation snails eat they will get more or less manganese. The amount in water plants is singularly larger—roughly about twenty times in the higher plants—than in land species. It should, however, be noted that the water plants were analysed as they were, being simply washed under the tap and then dried. The figures include, therefore, the manganese in any epiphytic life, which coats most water plants, [9] and in any inorganic deposit [10]; in the

1 The trees from which excessively manganiferous snails and slugs were obtained (supra p. 18).

2 The fungi on which the *Arion ater* with most managnese (supra p. 18) was feeding.

3 Snails were eating this freely ; *stagnalis* gave 1·4 *peregra*, 4·4.

4 *L. peregra* living among this gave 3·1.

5 *L. peregra* living among this gave 3·6.

6 *Eurhynchium rusciforme* v. *alopecuroides*.

7 *Ancylus fluviatilis* living among this gave 21.

8 Deposit consisted largely of calcium carbonate.

9 see *e.g.* J. G. Needham and J. T. Lloyd, *Life of Inland Waters*, 1916, p. 336.

10 A. Kerner and F. W. Oliver (*Natural History of Plants*, 1902, Vol. I., p. 261), record 1·2 per cent. of manganese in the deposit on the leaves of *Potamogeton lucens*.

case of *Pot. crispus, natans* and *densus*, the first figure refers to fresh shoots, the second to older, discoloured portions. The sinter was most obvious in the specimens of *Pot. crispus, lucens*, and especially *perfoliatus*, and the fact that the figures for these species are on the whole rather low suggests that it is not a very important factor in raising the content in manganese. I daresay that the prodigious amount of manganese in the hydrohypnum was largely a surface deposit or entangled precipitate which was not removed by moderate washing and squeezing in water,[1] but in any case an animal feeding among it would probably pick up a good deal.

Taking the figures in a general way, algæ and such like[2] (but not fungi[3]) seem to have a good deal more than the higher plants, and the suggestion that the manganiferous snails (*Hyalinia, Buliminus*) eat specially large amounts of these is obvious. Note, too, that Scharff[4] classes *L. maximus, arborum, Arion subfuscus, minimus* and *Geomalacus* as the slugs which characteristically feed on non-chlorophyllaceous plants. It is rather curious that water snails have much less manganese that the manganiferous land species, considering its much greater abundance in water plants.

Summary.

The proportion of manganese in the bodies of land and fresh-water mollusca varies widely in different species; there are exceptionally large amounts in *Anodon, Unio, Buliminus, Hyalinia, Ancylus* and *Limax* (partly), while *Sphærium* and the *Helicidæ* have comparatively little.

I am very much indebted to a number of friends for kindly help, and Miss M. Boycott, Mr. Charles Oldham, the Rev. Dr. Cooke, Miss Hopton, Mr. J. W. Jackson, Mr. R. Standen, Mr. W. D. Roebuck, Mr. J. W. Taylor, Mr. H. Beeston and Dr. E. J. Salisbury have supplied most useful specimens and other assistance. It is evidently desirable that specimens from a wider range of localities and habitats, especially from the north, should be examined, and I should be particularly glad of help in clearing up the positions of *Limax arborum, L. subfuscus, L. cinereoniger, H. lapicida, Planorbis corneus, Paludina* and *M. margaritifera*. I have also been unable to gain any information about the occurrence of *Crenothrix manganifera* in this country: an account of it is given by D. D. Jackson.[5]

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[1] This is supported by the fact that two different samples gave widely varying results, viz., 890 and 489.

[2] My botanical identifications are terribly inadequate: I hope someone better equipped may investigate the matter.

[3] I judge this from my own analyses, and the summary statement of Jadin and Astruc, *Comptes Rendus*, Vol. CLV. (1912), p. 406.

[4] *Sci. Trans. Roy. Dublin Soc.*, Vol. IV. (1891), p. 513.

[5] *Trans. Amer. Micro. Soc.*, Vol, XXIII. (1902), p. 31.

W. J. FORDHAM, M.R.C.S., L.R.C.P., F.E.S.

VERY little has been published during the year relating to the Coleopterous fauna of the county. The only excursions of the Yorkshire Naturalists' Union at which beetles were obtained were Malton (see *The Naturalist*, 1916, Aug., p. 265—32 species), and Bolton Woods (*The Naturalist*, 1916. Sept., p. 293—53 species, including *Malthodes brevicollis* Pk. (*nigellus* Kies) new to the county).

Mr. C. Mosley has an interesting note (with photograph) on *Brachycerus cinereus* Ol., an imported Weevil at Sheffield (*The Naturalist*, 1916, May, p. 174).

In *The Entomologist's Monthly Magazine* for 1916 are several notes of interest to Yorkshire Coleopterists, including in March, an Obituary Notice of Edward Alexander Waterhouse. When a young man, Mr. Waterhouse was Museum Curator to Earl de Grey at Fountains Hall, and added many rare and interesting species to the Yorkshire list from Studley and neighbourhood, as the list of Yorkshire beetles in the Victoria County History, Canon Fowler's 'British Coleoptera,' and the early volumes of the *E.M.M.* testify. The Waterhouse Collection of British Coleoptera, which probably contains many Yorkshire species, is now in the Museum of the Entomological Department of Edinburgh University.

Mr. E. G. Bayford notes that during the past year, the most noticeable thing has been the profusion of *Pterostichus madidus* F., which has swarmed all over the Barnsley district. The capture of a specimen of *Leptura sanguinolenta* L. has already been recorded. He has seen a specimen of *Blethisa multipunctata* L. taken on August 19th by the side of a stream running through a field at Beeston, near Leeds, thus providing a fresh locality for this very local and uncommon insect. A few specimens of this beetle have also turned up again in Mr. Bayford's original locality.

Mr. J. W. Carter contributes the following list of species from the Bradford district :—

COLEOPTERA.

Synuchus (*Taphria*) *nivalis* Panz. Grassington. F. Rhodes.
Oxypoda opaca Gr. Addingham. F. Rhodes.
O. haemorrhoa Mann. Bingley. F. Rhodes. *64. (There is only one previous record. Scarborough. 1865).
Aleochara maesta Gr. Sunnydale. J. Ashworth.
Athcta insecta Th. Bradford. T. Stringer. *63.
†*Atheta aterrima* Gr. Bingley. F. Rhodes.
Conosoma littoreum L. Frizinghall. F. Rhodes.
Tachinus laticollis Gr. Bingley. F. Rhodes. *64.
Philonthus longicornis Steph. Frizinghall. F. Rhodes. *63.
Stilicus rufipes Germ and *S. erichsoni* Fauv. (*orbiculatus* Er.). Addingham. F. Rhodes.

Lesteva heeri Fauv. Shipley Glen. F. Booth.
Megarthrus sinuatocollis Lac. Saltaire. F. Rhodes. *63.
Euplectus sanguineus Den. Addingham. F. Rhodes.
Micropeplus fulvus Er. (*margaritæ* Duv.). Bingley. F. Rhodes.
Monotoma longicollis Gyll. Bingley. F. Rhodes.
Cartodere ruficollis Marsh. Bingley. F. Rhodes. *64.
Riolus (*Elmis*) *cupreus* Müll. Malham. F. Rhodes. *64.
Scaphidema metallicum F. Frizinghall. F. Rhodes.
Alphitobius piceus Ol. Bradford. T. Stringer.
Orchestes rusci Hbst. Frizinghall. T. Stringer *63. Saltaire. F. Rhodes.

Mr. M. L. Thompson writes that he never did less collecting during a season, and June was a bad month. Two days in Swaledale in September, added nothing new to his previous records from this locality. *Miscodera arctica* Pk. was picked up in September at the head waters of the Esk above Castleton.

Mr. G. B. Walsh, in addition to *Trichopteryx fratercula* Matth. (recorded in the *E.M.M.*), records:—
Anacæna limbata F. var. *nitida* Heer. (*ovata* Reiche). Askham Bog. 19th April, 1915.
Cercyon nigriceps Marsh. Bubwith. *61.
Mycetoporus splendidus Gr. and *brunneus* Marsh (*lepidus* Gr.). North Cave. Both *61.
Xantholinus tricolor F. Eston Nab and North Cave.
Oxytelus inustus Gr. Glaisdale.
Olophrum fuscum Gr. Eston Nab.
Agathidium varians Beck. Dalton. *65.
Haltica britteni Shp. Cotherstone (V.C., 65) in small numbers. This is the species described by Dr. Sharp (*E.M.M.*, 1914. Nov. 261) as distinct from *ericeti* Allard. It is said to have been found by Wilkinson at Scarborough on *Helianthemum* (Rye, *Ent. Ann.*, 1869, p. 55), but Dr. Sharp doubts the correctness of this observation. It appears to be a northern species and it probably not uncommon on *Erica*.

As a further confirmation of the help received in the past by the Coleoptera Committee from other members of the Union, a large consignment of beetles was sent to the Secretary by Mr. W. Falconer, and contained, among many other species of interest, *Barypithes araneiformis* Schr, *64, *Atomaria apicalis* Er., *64 and *Tachyporus atriceps* Steph. (*humerosus* Er.) from cut-grass heaps by roadside, Thornton in Lonsdale, 4th August, 1916; *Atomaria apicalis* Er., *63 and *Amara lunicollis* Sch. (three specimens—one bluish-black) from Chew Valley, Greenfield, 15th July, 1916; *Atomaria apicalis* Er., and *Brachysomus echinatus* Boris, *64 from Rigton Bank, Bardsey, 28th June, 1916; *Choleva Kirbyi* Spence, *63 from Hardcastle Crags, 12th June, 1916; and *Deliphrum tectum* Pk., and *Syntomium æneum* Müll. *63 from Slaithwaite, 28th April,

1916. The writer obtained a profusion of beetles from flood refuse from the River Derwent at Bubwith in January, but the only species worthy of note were † *Anthracus consputus* Duft. (one), † *Atheta gyllenhali* Th., and *A. debilis* Er. A few moles' nests in February produced *Quedius nigrocæruleus* Rey. (8), *Aleochara spaaicea* Er. (7) *61, and *Oxypoda longipes* Muls. (1) *61; but in March, although 56 nests were examined, owing to the extreme wetness of the ground very few beetles were obtained, though even nests saturated with moisture contained beetle larvæ, fleas and mites. The species obtained were *Quedius talparum* Dev. (20), *Q. nigrocæruleus* Rey. (2), *Q. brevicornis* Th. (2), *Hister marginatus* Er. (1), *Aleochara spadicea* Er. (3), with single examples of *Clivina fossor* L., *Tachyporus chrysomelinus* L., *Oxytelus tetracarinatus* Block. (which at first raised hopes of the mole's nest *Saulcyi* Pand.), and *Epuræa depressa* Gyll. (*æstiva* Er.). Three visits to Barmby Common, near Pocklington (April 26th, June 9th and July 29th) produced *Litargus connexus* Geoff., (*bifasciatus* F.) in profusion in colonies of six to a dozen or so under bark of birch stumps, but very difficult to capture many at a time, owing to their agility (a single specimen was also taken at Bubwith under ash bark). With the last species, also occurred *Diphyllus lunatus* F. (*61) and in fungi on the stumps were † *Cryptophagus ruficornis* Steph., and † *Cis setiger* Mell (*villosulus* Marsh); *Dorytomus salicis* Walt. *61, and *Deporaus mannerheimi* Humm. (*megacephalus* Germ.) *61, were beaten from sallow and birch respectively.

At Escrick on April 15th, *Phloeonomus pusillus* Gr. *61 and *Hylastes palliatus* Gyll. occurred under fir bark and † *Atheta fungivora* Th. was taken in a fungus, and on June 16th *Brachytarsus* (*Anthribus*) *variegatus* Fourc. (*varius* F.) *61 was beaten from young conifers, and *Dryophilus pusillus* Gyll. from both these and oak. By general sweeping were taken *Orchestes rusci* Hbst. *61, *Cocliodes rubicundus* Hbst. *61, and *Alophus triguttatus* F. Skipwith Common produced on July 15th, *Dorytomus rufulus* Bed. (*pectoralis* Gyll.) *61 and *salicis* Walt. *61 from sallow, and † *Atheta sodalis* Er. and † *Gyrophæna nana* Pk. from fungi.

In addition may be noted a dark specimen of *Agonum ericeti* Panz. from Burton Moor, Cleveland (A. A. Fordham) *62 and a fine ♀ specimen of *Monochamus sutor* L. taken in a woodyard in Huddersfield by Mr. Cocker.

The dagger and asterisk are used as in previous reports to indicate additions to County and Vice-County lists respectively.

Much help has been given in the identification of many of the above species by Messrs. E. A. Newbery and W. E. Sharp, and the nomenclature of their 'List' has been followed as in the previous report.

1917 Feb. 1.

YORKSHIRE ENTOMOLOGY IN 1916.

B. MORLEY.

THE Annual Meeting of the Entomological Section of the Yorkshire Naturalists' Union was held in the Doncaster Museum on November 4th, 1916, under the presidency of Prof. Garstang.

Dr. Corbett had on exhibition his collection of local entomological specimens. The coleoptera and lepidoptera were well represented and filled many cases, and much had been done among the other groups, especially neuroptera, hymenoptera and diptera. It is evident that the Doncaster district is one of the best in Britain for insect life, and much credit is due to Dr. Corbett for his diligence. The reports which the various committees have supplied for the annual meeting of the Union were read and passed. Supplementary to the lepidoptera report, Mr. T. Ashton Lofthouse has sent the following : "Generally speaking, the most noticeable feature has been the lateness of appearance of most of the species this year, due, no doubt, to the cold weather, which also seems to have accounted for the non-appearance of any of the Vanessas this autumn, not a single one has been noticed in the garden where, on the flowers of *Sedum spectabile*, we usually have *V. urticæ* and *V. atalanta*, and sometimes *V. cardui*.

"There has been no 'sugaring' or lantern work owing to military restrictions, but I have taken one or two interesting small species in my garden.

"Towards the end of May, I bred a nice lot of *Coccyx strobilella* from spruce-fir cones, fully a month later in hatching out than usual. I also took or noticed in the district, *Clepsis rusticana*, *Gelechia æthiops*, and bred *Lithocolletis frolichiella* from alder. In June, I took *Grapholitha unguicella* in Upper Teesdale (Yorkshire side).

"In July, *Stigmonota coniferana*, *Argyresthia atmoriella*, and *Lithocolletis laricicella* on Eston Hills, and *Hydrocampa stagnalis*, including the pale form, near Redcar. In the garden at Linthorpe, *Eubulea crocealis* occurred about *Inula glandulosa* plants. *Spilonota roborana* and *Argyrolepia cnicana* were also noted. In August, in the garden, *Grapholitha nævana* about holly, a good specimen of *Dictyopteryx forskaleana*, *Sciaphila pascuana*, *Coccyx nanana* freely about some fancy spruce firs flying in the early evening on and about August 9th, this date being fully six weeks later than I have usually noticed it in another local locality, these being the only Yorkshire records, I believe, with one exception. *Argyresthia semifuscana*, *Ornix anglicella* and *Laverna hellerella* were also noticed, and a specimen of *Scoparia angustea* was taken off a tree in the road near. On August 12th, in another locality in the district,

Grapholitha trimaculana, G. cinerana (among aspens), *Olindia ulmana* and *Sciaphila sinuana* were taken."

Dr. Fordham exhibited nine species of coleoptera new to the Yorkshire list and several new to V.C. 61 (S. E. Yorkshire), etc., details of which will appear in his report to be presented in *The Naturalist* shortly:—*Anthracus consputus, Atheta gyllenhali* and *Trichopteryx fratercula* from Bubwith, *Gyrophæna nana* and *Atheta sodalis* from Skipwith Common, *Atheta fungivora* from Escrick, *Cryptophagus ruficornis* and *Cis villosulus* from Barmby Common, near Pocklington, and *Malthodes nigellus* from Bolton Abbey, and the following species new to V.C. 61, S.E.Yorks:—*Diphyllus lunatus, Dorytomus salicis, D. pectoralis, Brachytarsus varius, Atheta debilis, Oxypoda longipes, Cocliodes rubicundus, Deporaus megacephalus* and *Orchestes rusci*, and a specimen of *Anchomenus ericeti* from Cleveland (new to V.C. 62, N. W. Yorks.) and also *Brachycerus cinereus*, an imported weevil (see *Naturalist*, May, 1916). Among several rare and interesting specimens (British, but not Yorkshire), were *Pterostichus angustatus* (recently added to the British list), *Anchomenus 6-punctatus* and *A. 4-punctatus* from Crowthorne, Berks., taken by Mr. W. E. Sharp, and some interesting colour varieties of various species. Mr. William Hewitt exhibited a fine collection of Coleoptera, collected by the late Mr. C. W. Simmons of York, and Mr. Ed. Cocker showed a ♀ *Monochammus sutor* L. taken in a wood-yard at Huddersfield.

Mr. E. G. Bayford showed *Leptura sanguinolenta* L., a ♀ caught at Barnsley, July 20th, 1916, and the Hemipterous *Gerris najas* De. G., Walton, August 24th, 1916 and *Nabis flavo-marginatus*, Scholtz, near Buxton, August 21st, 1916.

The exhibits of lepidoptera were as follows:—Mr. J. Hooper, a series of *Oporabia filigrammaria*, from Penistone Moors, Mr. Ed. Cocker, a series each of *Hydræcia petasitis, Polia flavocincta, Hadena glauca* and melanic *Cleoceris viminalis* from the Huddersfield district; and Mr. B. Morley, *Pieris rapæ* and a fine series of *Pieris napi*, taken by Dr. Smart in Northern France, and also a series of heavily marked *P. napi* of North Irish origin.

At the evening meeting, Mr. B. Morley gave an address based on a collection of lepidoptera made by Dr. Smart in the area between Arras and the Somme Valley in France during 1916. The most striking feature of the collection is its remarkable British character. Thirty-one species of butterflies are represented, and only three, *Melitæa parthenæ, Lycæna cyllaris* and *Syricthus alvæus* do not occur in Britain. Generally, the colours of the insects do not excel in brilliance, but in certain cases are of larger size than British ones. Males of *Pieris rapæ* are large and white, the females ordinary and contrast strikingly with *P. brassicæ*, the males being much

under-sized and the females very large. Of the two British species of *Colias*, our rare *hyale* has been common, but no *edusa* has been sent, the reverse of what one would have expected. There is a large and fine series of *Lycæna icarus*, some of the females being of a fine dark blue shade: there are also many fine under-side varieties.

About sixty species of moths are in the collection. *Nola centonalis* and *Boletobia fuliginaria* being represented and noteworthy as being of rare occurrence in Britain; indeed, every species of moth sent occurs in Britain.

Mr. E. G. Bayford addressed the meeting on two recently published works of interest to Yorkshire Entomologists—(1) 'British Ants: their life history and classification,' by H. St. J. K. Donisthorpe, F.Z.S., etc. This book deals very fully with the British species of ants and should be of great use to students. (2) A Compilation by Prof. Carr, M.A., of the Invertebrate Fauna of Nottinghamshire. The class hemiptera was chosen by the speaker as offering an excellent means of comparing the fauna of a neighbouring county with our own. *Gerris najas* De G., which has occurred for several years at Walton, is not recorded for Notts. (See notice in *The Naturalist*, 1916). A discussion upon both papers followed. A vote of thanks to Dr. Corbett for his kindness brought an enjoyable meeting to a close.

—: o :—

BIRDS.

Turnstones in Upper Wharfedale.—On December 30th, the country around here was much flooded. At Escroft (between Ben Rhydding and Burley), I was surprised and delighted to see two adult Turnstones on the margin of a small flood. As is usual with Turnstones, they allowed a near approach, and then only flew to the opposite side of the water.—HARRY B. BOOTH, Ben Rhydding.

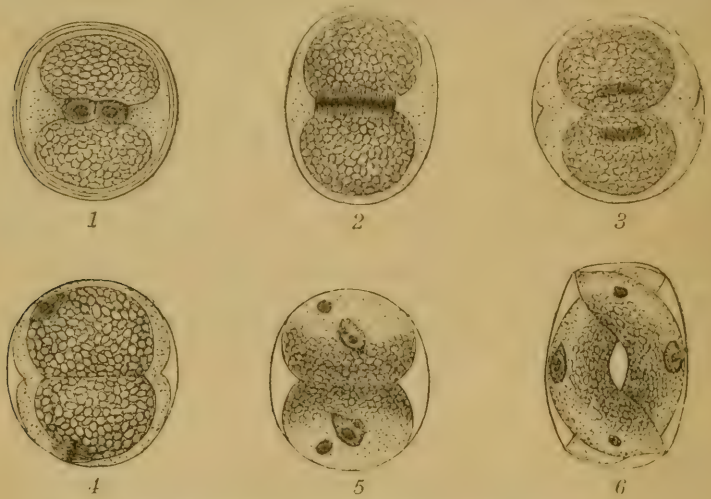
Wild Geese in Upper Wharfedale.—On December 13th, after wild weather, a flock of about twenty 'Grey' Geese settled in a large marshy field at Denton—just on the opposite side of the river to Escroft. They would most probably be Pink-footed Geese; but as none were shot, they could not be correctly identified. Although from time to time, Wild Geese are noted, or heard flying over this district, it is very rarely that a flock settles, and the local farmers prophesied that it meant a continuance of bad weather.—HARRY B. BOOTH, Ben Rhydding.

—: o :—

The Entomologist's Record for December contains a note on 'The Alate Females of the Ant-aphis Forda,' with plate.

BOOK NOTICE, Etc.

Algæ (Vol. I.). By **G. S. West, M.A., D.Sc., etc.** Cambridge University Press, 1916, 475 pp., 25s. net. We must tender our sincere congratulations to our valued contributor, Prof. West, and the Cambridge University Press, on the production of a magnificent volume, which will doubtless remain the standard work on the subject for some time to come. Twelve years ago Prof. West issued his well known 'Treatise on British Fresh-water Algæ,' which was soon out of print. The present is one of two volumes, which will take the place of the Treatise, and will include particulars of the various discoveries which have been made in this fascinating branch of botany in recent times. The present volume contains particulars of the *Myxophyceæ*, *Peridinieæ*, *Bacillarieæ* and *Chlorophyceæ*, with particulars of the occurrence and distribution of



Germination of the zygospore of *Closterium* sp.

1. Zygospore just before germination, the nuclei of the gametes not having yet fused; 2. The first mitosis of the fusion-nucleus; 3. First division of nucleus completed; 4. The second mitosis; 5. Completed division of protoplast into two cells, each showing a large nucleus and a small nucleus; 6. Further stage in germination, the cells beginning to assume a definite shape. All × 308. (After Klebahn, from Oltmanns).

Freshwater Algæ. From the remarkably complete Bibliographies given in each section of the work, as well as from the text itself, it is apparent that Prof. West is master of his subject. Though in a difficult study such as the Algæ, illustrations are essential, it must be conceded that the author has more than met the wishes of the most exacting critic. There are nearly 300 figures, and quite frequently, each figure has ten or more separate drawings. For clearness of detail and accuracy of draughtsmanship, they would be difficult to beat. We are permitted to reproduce one of them (fig. 236) herewith, which in itself illustrates, by the description given, the thoroughness and interest of Prof. West's volume.

——: o :——

We have received Vol. I., part 2 of *Coleoptera Illustrata* by Howard Notman, 136 Joralemon Street, Brooklyn, N. Y. It consists of 50 plates, illustrating the *Carabidæ*. The illustrations are all enlarged, and each is supplied with the name, dimensions and particulars of distribution. The illustrations given would be excellent for hand-colouring.

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A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

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T. SHEPPARD, M.Sc., F.G.S., F.R.G.S., F.S.A.Scot.,
THE MUSEUMS, HULL;
AND
T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
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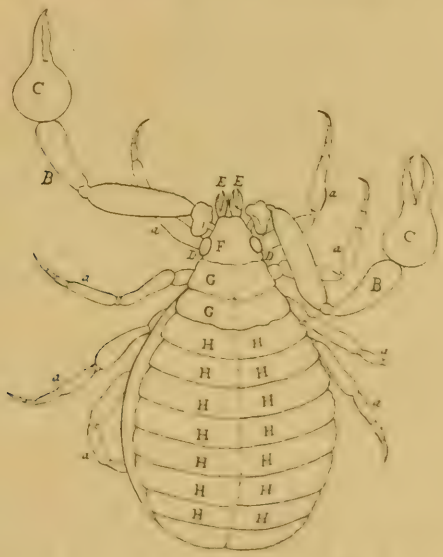
NOTES AND COMMENTS.

PSEUDOSCORPIONS.

In the *Journal of the Quekett Microscopical Club*, No. 79, Mr. H. Wallis Kew gives 'An Historical Account of the Pseudoscorpion-Fauna of the British Islands,' in which he describes most of the important publications dealing with these animals, and he enumerates the twenty-four species which are known for the British Islands. He gives an interesting illustration of a specimen of *Cheiridium museorum* as figured by R. Hooke in his 'Micrographia: or some Physiological Descriptions of



Minute Bodies made by Magnifying Glasses,' which was printed so long ago as 1665. Bearing the date in mind, this drawing of the 'crab-like Insect' by Hooke is a remarkably good one. We are kindly permitted to reproduce the illustration. Notwithstanding the unfavourable conditions obtaining on account of the war, the volume recently issued is very encouraging, and shows that much good work has been done by the Club during the year.

NATURAL HISTORY PUBLICATIONS,

During the past two or three years, it has been painfully necessary to record the decease of many valuable scientific publications, some of which had appeared regularly for about half a century or so. Such of these as are of general interest may be found in the larger Libraries, and can be referred to, if necessary, by workers. On the other hand, the records,

often valuable, which appear in local publications, are not so easily accessible, and hence it is very desirable that very careful consideration should be given before any new publication is started. As was pointed out in 'Yorkshire's Contribution to Science,' in this county alone, many really valuable publications have appeared in comparatively recent years, and these have contained records in various branches of Science; but unfortunately it rarely happens that the enthusiasm, scientific standing, and finances of a Society, are sufficiently lasting to ensure permanence.

AND PERMANENCE.

The result is the periodical ceases to appear, sometimes in the middle of a Volume, and strangely enough, few people seem to bother to preserve their copies. Even in such a publication as *The Naturalist*, only one complete set is known to exist. At Bradford, Halifax, Leeds, Barnsley, Hull, York, and other places, useful publications appeared from time to time; they had their little day and ceased to be. Other Yorkshire towns have commenced publishing literature of this kind, but in many instances, have not succeeded in issuing more than one or two parts. While such publications may satisfy the passing desires of one or two enthusiasts, their multitude seriously handicaps research. While, therefore, we hope that Societies already publishing proceedings regularly, will continue to do so, we trust any others who may have anything of the kind in mind, will very carefully consider their responsibilities in case the publication is not permanent.

WHAT IS INSTINCT? *

The name of the author seems new to us, though his methods of argument seem familiar. According to the prospectus, 'the book opens a new page in nature study and suggests a theory which may illuminate many of the mysteries of animal life.' On the other hand, it may not; and while a new page may have been opened, it is what is upon the page that matters. The author begins with a quotation from the *Daily Mail*! and though he lays no claim to deep scientific learning, he is constrained, in the interests of science, to submit his observations . . . He points out that 'persons having subliminal tendencies are generally described as "gifted." One has the gift of clairvoyance, another the gift of psychometry, whilst a third is endowed with the power of water-finding (divining) and so on.' And he thinks that 'these manifestations should not be considered in the light of special gifts, but rather as fitful recurrences of faculties prevailing in times before the

* By C. Bingham Newland. London: John Murray. 213 pp., 6s. net.

evolution of self-conscious mind, and in which heredity takes part.' He then states (and here, presumably, is the new page in nature study) 'analogous faculties when manifested in animals are vaguely described as "instinct."'

ANIMALS AND TELEPATHY.

But though those 'gifted with clairvoyance and divining' appeal to Mr. Newland, and he believes in them, there are very many others who look upon them with very grave suspicion, so much so that we should not like to think that 'animals' (in which word our author apparently does not include man), were under such suspicion. He also points out that while man cannot detect truffles underground, a pig or a dog can; and while a man cannot smell a jack snipe held in his hand, a dog is aware of its presence when fifty yards distant. 'If these performances are due to the sense of smell, they transcend anything we understand of that faculty,' the author adds. And because of the author's inability to understand, the dogs and pigs are presumably endowed with powers of divining or clairvoyance. The author follows up his argument with chapters on the Puss Moth, Eggs of Birds, Frogs and Toads, etc. The following is a sample of his argument (pp. 60-61):—

A BAD EGG.

'For the sake of convenience, I have used the expression "a bird is aware of an addled egg." Perhaps it would be more correct to say that, so far as the bird, an unreasoning creature, is concerned, an effete egg is non-existent; there being no life in it, all connection between the bird and the egg ceases; thus the bird ignores the egg because, mentally, she is *unaware* of it. Hence, notwithstanding its perfect outward resemblance to the others, the pied flycatcher takes no notice of the rotten egg, but leaves it in the nest along with the chips and other rubbish!" No, Mr. Newland can endow his animals with divining, clairvoyance, telepathy, or psychometry, but we prefer "instinct," whatever it means; often it is largely common sense.

MESOZOIC CYCADS.

At a recent meeting of the Geological Society of London, Dr. Marie C. Stopes gave an account of some recent researches on Mesozoic 'Cycads' (Bennettitales), dealing particularly with recently-discovered petrified remains which reveal their cellular tissues in microscopic preparations. To make the significance of the various fossil forms clear, Dr. Stopes first showed some lantern-slides of living Cycads, and then pointed out that it was in their external features and in their vegetative anatomy only that the fossil 'Cycads' were like the living forms; the most important features, the reproductive organs,

differ profoundly in the two groups, and the fossils were fundamentally distinct, not only from the living Cycads, but from all other living or fossil families. The fossils representing the group that are most frequently found are (*a*) trunks, generally more or less imperfect casts or partial petrifications, and sometimes excellent petrifications preserving anatomical details and cell-tissues ; (*b*) impressions of the foliage. Not infrequent are the detached impressions of incomplete ' flowers ' or cones, of one cohort (the Williamsoneæ), while petrified fructifications are numerous in some of the well-petrified trunks of the Bennettiteæ.

METHODS OF OCCURRENCE.

The described species of the group run into hundreds, but probably many of these duplicate real species, because the foliage, trunks, pith-casts, various portions of the fructifications, etc., have often been separately found and named. In very few cases have the different parts been correlated. The species of the foliage are the most generally known, as they are the most readily recognized with the naked eye ; they have been described under a variety of generic names. The following table gives the proved, or probable, associated parts of some members of the group :—

Foliage.	Trunk.	Fructifications.
Zamites spp.	*Bennettites* spp.	*Bennettites* spp.
Zamites gigas.	Attached, no separate name.	*Williamsonia gigas.*
Otozamites sp.	.....	*Williamsonia spectabilis.*
Ptilophyllum pectinoides.	.....	*Williamsonia whitbiensis.*
Anomozamites minor.	(Only slender branches known, no name).	*Wielandiella angustifolia.*
Tæniopteris vittata.	.....	*Williamsoniella coronata.*

NATURAL HISTORY 150 YEARS AGO.

We recently obtained a work entitled ' The Natural History of England ; or A Description of each particular County In Regard to the curious Productions of Nature and Art,' in two volumes. Vol. I., 410 pp., 1759 ; Vol. II., 392 pp., 1763. ' Yorkshire' occupies pages 273-304 of the second volume. Of ' natural history ' as we know it, however, there seems to be but little. For instance, ' the Soil, Air and Product, greatly vary in different Parts of the County : in some Places, the Ground is of a stony, sandy and barren Nature ; in others it is pungent and fruitful . . . In the extreme Parts, you meet with scarce any Thing but craggy mountainous Rocks and Moors, which produce little else than Heath. Here the air is sharp and bleak, and the Hills are frequently covered with Snow till *May*. The more wild and uncultivated Parts are not without several useful Products, as large quantities of Iron Ore, Allum, Jet, Lime, Liquorice, Coals, and good Stone : One Sort particularly that slits into Slabs three of four Feet Square. Here

are likewise great Plenty of Game, which occasions their being resorted to by Gentlemen, who find it necessary to carry provision with them.'

THE EAST RIDING.

'The Middle of this Division is Sandy and Dry, and less fertile, which is called *Yorkswould*. However, these are great Downs, which produce some Corn . . . The Soil about these *Woulds* abound with Chalk, Flints, Fire-stones, &c., and in diverse parts of it, there are Mines of Coal and Freestone; near *Bogthorpe* and Leppington, are found the stones called *Astroites*, dug out of a blue clay . . . . The *Marr water* [Hornsea Mere], which is in the Way from *Bridlington* to *Hornsey*, is pretty deep and always fresh: it is about 2 Miles long, and ½ a Mile broad, and abounds with the best Perch, Pike and Eels; it is said, at first, to proceed from some Earthquake, with a Flux of Water following it! The Fuel of the *Riding* is chiefly Pit-Coal, but it does not want wood and turf.'

THE NORTH RIDING.

'Besides Wood and Coals, this *Riding* produces Marble, Allum, Jett and Copperas . . . . The chief Allum-works were carried on by the late Duke of *Burlington* at *Whitby*, where was the greatest Plenty of this Mineral.—As for Jett, Geat or black Amber, in *Latin*, *Gagates*; though the name is given to the Agate . . . it is found . . . in the Chinks and Crevices of the Rocks near the Sea . . . Besides the famous *Spaw* at *Scarborough*, there is a well near *New Malton*, whose Waters are supposed to have the same Virtue, but the spring is too weak to afford a large Quantity. There are likewise, mineral Waters upon *Ounsberry-hill*, or *Roseberry-chopping*, and at the very Top, there flows a clear Spring of Water, esteemed very salutary for sore eyes.'

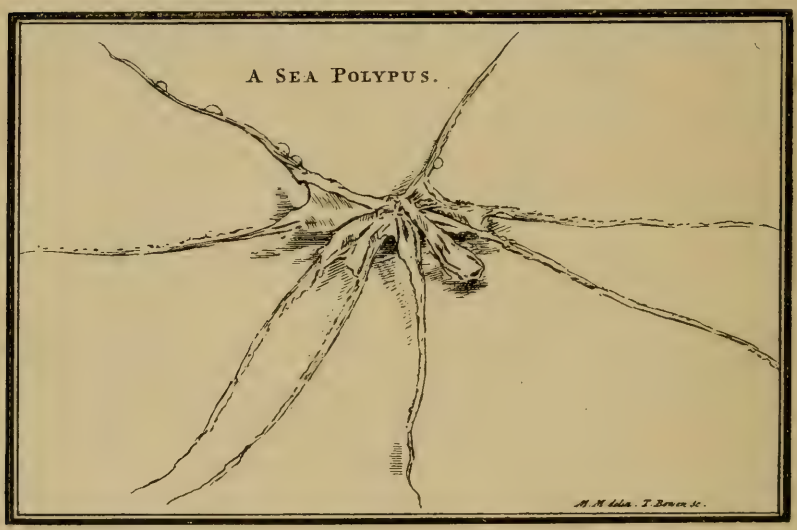
SCARBOROUGH.

Of Scarborough we claim that 'The medicinal Waters are, in their Nature and Operation, powerfully Cathartic and Diuretic, communicate a sensible Alacrity to the Mind, Strength and Vigour to the Body, and Elasticity to the Stomach'—The qualities of the Spaw are 'a Compound of Vitriol, Iron, Allum, Nitre and Salt, very transparent, inclining somewhat to a sky-colour, and of a pleasant taste.' Another 'spaw' is recorded:—'About a Mile from *Beverley*, in a Pasture called *Swinemoor*, is a Spring of a mineral Nature; though it is scarce distinguished by the Taste, it has been found of a very drying Quality, and when applied, inwardly or outwardly, to be of Use in the Cure of scorbutic Humours'! Such was the 'natural history' of Yorkshire a century and a half ago!

AN EARLY OCTOPUS RECORD.

In the first volume of this 'Natural History,' is an early and quaint record of *Octopus vulgaris*, together with a plate,

which we reproduce on a slightly reduced scale. It is recorded that :—'At this place [St. Agnes, Cornwall], in the Creek, among the Rocks, was taken a singular and most extraordinary Sea-Animal, which we think may be properly called a Sea-Polypus : It consists of a small Body about the bigness of the Palm of the Hand, to which was annexed a hollow Pouch, and on the middle part of the body was a curious beak, or Bill, about an Inch and Half long, and three quarters of an inch wide, of a roundish form, a Tortoise-shell colour, and curved somewhat like a Parrot's Bill : from the body proceed eight legs, nearly at an equal distance from each other, about an inch and a quarter wide at the body, and nearly 30 inches long, of a tapering



form, terminating in a point at the Extremity ; the Legs were of fleshy and membraneous Substance and thick set with small pouches, or Holes (about half an inch wide the largest), diminishing gradually towards the Extremity, in each leg. These holes seemed destined to answer the design of Gills, in common fish ; of these Holes, there were between 30 and 40 in each leg. These legs were all contracted and enclosed in the pouch, or loose bag, on one side of the body, and the animal lay seemingly asleep, when first observed ; the person, however, striking it with a stick, it expanded its legs with great violence, and put itself, as it were, in a posture of defence ; but by repeated blows, it was subdued, and it appeared of so surprising a Form, and such an animal never before observed, we have thought the representation of it, hereto annexed, would be very acceptable to our Readers.'

Naturalist,

THE OCCURRENCE OF THE RARE MINERAL, MONAZITE, IN THE MILLSTONE GRIT OF YORKSHIRE.

A. GILLIGAN, B.Sc., F.G.S.
Leeds.

THE presence of fragments of garnets in the Millstone Grit was recorded by W. C. Trevelyn as far back as 1835, and other workers have since detected them in the same series of rocks in widely separated districts. They have been found by the writer to be very common in all the coarser beds of the series examined by him. Generally, they are sporadically scattered through the mass of the rock, but a fortunate discovery of garnetiferous layers in the Rough Rock of Cragg Hill Quarries, Horsforth, called for a closer investigation, not only of the garnets, but of the associated heavy minerals in these layers. These include zircon, tourmaline, rutile and monazite. This last mineral, which is a phosphate of the rare earths cerium, lanthanum and didymium (Ce, La, Di) PO_4, with some silicate of thorium, Th Si O_4, occurs as rounded, honey-yellow grains, which, however, are often clouded by alteration products. No trace of crystal outline has so far been observed, although the zircons with which it is associated, show perfect crystal forms, the faces being easily determinable. This difference in form is, of course, accounted for by the lower degree of hardness of the monazite, which is only 5.5 (Moh's scale), as compared with 7.5 of zircon.

Though only a small quantity of the monazite has so far been separated, it has yielded satisfactory chemical tests for the phosphate. The most reliable test however, is afforded by the spectroscope, the mineral when examined by direct sunlight giving an absorption spectrum which makes it unmistakable. Prof. Bowman, of Oxford, has very kindly confirmed the spectroscopic tests, so that there can be no doubt of the correct identification of the mineral.

Since monazite occurs in granites and granite gneisses, and especially in crystals of considerable size, in pegmatites, its presence in such a rock as the Millstone Grit is not surprising, for the lithological character of the grit makes it quite certain that it was derived from such types of rocks as those mentioned above.

Having with certainty determined its presence in the Rough Rock, a search was made for it in other beds of the Series, and it is found to be of widespread occurrence. It has been found in the Kinderscout Grit and Middle Grits of several localities. It occurred to the writer that it might also be found in the glacial sands of Airedale, such as those at Newlay, and on examination, this was found to be the case. In these sands it is associated with the usual heavy minerals of the Millstone

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Grit, proving, if such proof were needed, that the sands and associated gravels of glacial origin in Airedale are made up of locally derived material.

In view of the mineralogical work upon the clastic deposits now being carried on in various parts of the British Isles, it has been thought advisable to publish this record.

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A NEW BRITISH LICHEN.

Rev. W. JOHNSON.

I found the lichen here diagnosed, in Teesdale, Durham, that favourite hunting-ground of the late W. Mudd. I classed it as follows :—

Lecanora privigna Nyl., var. *flava* Johns.—Thallus effuse, thinnish, more or less continuous, leproso-tartareous, rarely smoother or rimulose, yellow-grey K-C- ; apothecia moderate, innate at first with distinct thalline margin, then lecideine, depressed in the centre and occasionally convex, dark-brown or black, more or less circumcissed and white pruinose ; paraphyses discrete, except at the brown apices ; spores numerous, minute, oblong ; hymenial gelatine bluish, then intensely yellow-wine-red with iodine.

This lichen grows on the limestone, and was found in an old limestone-quarry, on the opposite side of the road to the Church, near Langdon Beck. I purpose including it in the 13th Fasciculus of 'The North of England Lichen-Herbarium,' which I hope to issue shortly.

Miss A. L. Smith, F.L.S., of the British Museum, Natural History Department, has classed this lichen as a new species, under the name *Biatorella flava* A.L.S., Syn. *Lec. privigna* Nyl., var. *flava* Johns, in the new Monograph on British Lichens.

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Cumberland Hemiptera.—A study of last autumn's captures has enabled me to add two more species and a variety to our county list. *Phytocoris dimidiatus* Kb., a single specimen, was beaten from Oak at Orton in September. In the same month, I beat several specimens of *Psallus alnicola* D. and S., from Alder near Dalston. By sweeping in a grassy lane near Kirkbampton, I captured a specimen of *Calocoris ochromelas* var. *fornicatus* D. and S. This is a very distinct variety, and in confirming my determination, Mr. E. A. Butler, B.A., F.E.S., says it is apparently a northern form, the original specimens having come from Durham. It is not included in Mr. Whittaker's Lancashire List, and it would be of interest to know if Yorkshire collectors have met with it.—Jas. Murray, 2 Balfour Road, Carlisle.

ORNITHOLOGICAL OBSERVATIONS AND REFLECTIONS IN SHETLAND.*

EDMUND SELOUS.

October 13th, 1911.—An episode just witnessed by me may give a hint as to the real meaning of the cormoroid (*sic*) habit of holding the wings 'out to dry.' A fine black Shag came forward in a manner denoting some special intention towards another, whose much browner hue and lightness on the breast—giving it the appearance of a small Common Cormorant—denoted it a young one. No sooner did the latter perceive the action of its parent than it bustled eagerly towards it, with open bill and extended wings, which it both shook and held out exactly as this is done by the mature bird throughout its life. For the hanging out of the wings is generally preceded by this shaking, which may often, before the final attitude is assumed, become a violent flapping. So, indeed, it did in the case of this young bird, after the parent had fed it and gone, and then it stood for some time, with wings extended, just after the fashion of its elders. It was impossible not to recognise in all these actions, the counterpart in its various stages, of the habit in question. It is now nearly the middle of October, and, as we see, some of the young are still being fed. One can understand that if the young Shag or Cormorant were fed to a somewhat late period, the actions connected with so important a matter being also continued, these might, by habit, be permanently retained, and pass into the after-life of the bird. When the parent opened her mouth to feed this young Shag (which she, this time fronted), the latter thrust its whole head and bill into it, up to the throat. Subsequently, either this one or another young bird, so teased its dam for food, that she flew into the sea, and it then pursued her there, causing her to dive.

To-day I, for the first time, saw something like real hostilities between two Shags. One flew over the water at another, who received it with severe peckings. The aggressor dived, but not as it appeared to me, to avoid these, but in order to attack its foe under the water, and the latter then dived also so as to avoid the attack. Shags often show some illwill towards new arrivals on the rock, receiving them with pecks (though generally these appear slight), and causing them to change their places of alighting.

The entrances of the 'hellirs' or caverns where the rock-doves breed here, are sometimes but little above the margin of the sea, and it is then a pretty sight to see the birds sink

* Continued from *The Naturalist* for 1916, p. 388.

down upon extended pinions against the face of the precipice, in order to enter. When a single one does this, one might think, at a little distance, that it was one of the hawk tribe, in pursuit perhaps, of the tenants of the cavern, instead of, itself, one of these.

October 14th.—I make out the coloration of the vast mass of the Kittiwakes, here, to be as follows:—viz., head, neck, breast, neutral surface and tail, white; back and wings, a pretty mauve colour, something that of the Rock Dove, but the primary quills or some portion of them from their tips backwards, are black, whilst the feathers bordering the upper part of the wing, on its inner side (that towards the tail) are white. The beak is black or blackish, and does not seem large, thus contributing, with the blueish or mauvy coloration, to the dove-like appearance of these pretty birds. The eye black. The legs seem to be of a dull slaty hue—not conspicuous or gaudy. The above is through the glasses, from some two hundred yards or so. It is principally the beak, therefore, which shows these birds not to be mature.

It is, to-day (near noon) as yesterday morning, but the number of Kittiwakes—eighty odd—is not so great; there has been more time for some to disperse. Twice has the whole assembly—to a Kittiwake, I think, the second time, at least—risen as by a *φημη*—that simultaneous common impulse, which the Athenians of old, noted as sometimes sweeping over popular human assemblies—flown out over the waters of the loch, wheeled and disported a little above them, and then all flown back again. Now (before I have finished the above entry) they do so a third time. The whole troop rise together from entire placidity, fly softly and in perfect silence, out to about the middle of the loch, and, without any wheeling or skimming, turn and fly softly back again. One spirit at one time has actuated every bird in the troop, for not one has stayed behind, and all seemed to rise at one instant. When I say not one, I mean of the Kittiwakes, for one Herring Gull has stayed.

How are these facts to be accounted for? The actions of the birds did not at all suggest that they were alarmed, nor was there anything that I cou.d observe to alarm them. Yet the conditions were such that I could hardly have failed to note anything of an alarming nature, had it been at all violent or salient, and nothing that I can think of, not answering this description, could have caused so many birds, scattered over so considerable a space of ground to rise thus, unanimously, as I have described. Before I had spent much time in watching birds, I was under the impression, as I believe most people are, that if one or two, or a few, of a number collected together, take genuine alarm, and rise in precipitate flight, the rest will,

as a matter of course, follow their example. Experience, however, has not verified this preconceived opinion, founded on mere plausible ignorance. Even in the case of birds so wary and alert as Woodpigeons or Pheasants, I have found that so potent a cause as my own approach has produced flight or retreat in such individuals (presumably), only, as actually saw me. I say presumably because it is not often possible to be quite certain that when half a dozen or so, for instance, fly off, one or two of these do not merely follow the others. When, however (to take Woodpigeons) the bulk remain, some evidently in a highly nervous state, and anxiously trying to discover the cause of their companions' flight, whilst others sit comparitively undisturbed, and when, during a further stealthy advance, the same class of phenomenon is repeated, the birds going off in successive batches with such sudden action as seems to demonstrate that each individual composing them has caught sight of the intruder, till on coming wholly into view, the residue rise all together or in quick succession—in face of such facts, it becomes fairly evident that each bird of the flock relies directly upon its own sense-impressions of any cause of alarm, and not, except in a subsidiary degree, upon those of its fellows. This subsidiary degree amounts, as a rule, to no more than a predisposition to flight, owing to the flight, through alarm, of others. It may be greater or less, according to circumstances or individual disposition, but, if not great enough to issue in action, it will gradually subside, in the absence of further ground for apprehension, so that many a flock that we may come upon, sitting quietly, and, as it would seem, hitherto undisturbed, may be more or less diminished in numbers—unless, indeed, the seceders have returned—through precedent alarms. In the case of Pheasants, I was once much interested in observing that when two birds, having seen me, ran swiftly off, a third that had not seen me, at first followed them but soon stopped, and being still unable to, came back and continued to feed as before. Though I remember this clearly, I can find no record of it, but the following is from notes on the spot :—' When the small birds fly suddenly off in a cloud, as they do every few minutes with a great whirr of wings, the Pheasants all stop feeding, look about, pause a little, seeming to consider, and then recommence, as though they had decided that such panic was uncalled for and that there was no rational ground of alarm. An hour or two later, three out of the four birds—for two have got gradually to the other side of the stack—see enough of me, in the straw, to make them suspicious, and go off at half pace. The fourth bird notes their retreat, looks all about, can see nothing to account for it, and, instead of

following them, as might be expected, goes on feeding.'* I have seen similar self-reliance markedly exhibited in the case of Shags and Rooks, and Starlings fall under the same category. In short, the above has been my general experience.

The surmise, therefore, that a certain number of the Kittiwakes flew up, because they saw something to alarm them, and that the rest followed, as it were, upon trust, would not satisfy me, upon general principles, even if I had not definite reasons for rejecting it; it is, in fact, out of harmony with too many of the facts of the case. As for the theory that the whole flock of some eighty odd were under the government of a leader who, in some way communicated a wish, for which all motive of urgency or importance seems wanting, to the whole of them, at almost the same instant of time, this also appears to me untenable. It is, at least, beset with difficulties. I saw no evidence of it here, nor have I in other and still more striking cases of the same kind. We therefore seem to stand in presence of a very puzzling phenomenon, that, namely, of occasional collective actions in birds, through what is apparently a collective impulse, not arising out of any sudden, simultaneous sense-perception, of a kind known to us. I shall later have occasion to refer to some striking testimony in corroboration of my own observations to this effect.

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The Practical Principles of Plain Photo-Micrography, by **George West** (University College, Dundee), 145 pp. 4s. 6d. net. This treatise, with its large type, paper cover, and wealth of marginal references, reminds one of a 'Blue Book'; though to a naturalist it is much more interesting and certainly more useful. The author has obviously had considerable practical acquaintance with his subject, and he explains the alpha and omega of photo-micrography, with illustrations of his apparatus, and reproductions from photographs of the results of his work. There is a quaint 'dialogue' between Old Surefoot and Young Castlebuilder, on the making of a photo-micrograph, which contains many useful hints. Naturalists interested in photo-micrography will find the book of service.

A Naturalist in Borneo, by the late **R. W. C. Shelford.** London, T. Fisher Unwin, pp. 331, 15s. net. All naturalists will be grateful to Prof. E. B. Poulton for the care with which he has edited and prepared the incompleted MSS. of Mr. Shelford, who died at a comparatively young age (he was born in 1872). In 1895 he was the demonstrator in Biology at the Yorkshire College, Leeds, and two years later he went to Borneo as curator of the Sarawak Museum. His seven years' stay in Borneo enabled him to write a series of fascinating chapters on the natural history of that country, chapters which are so full of accurate observation and scientific deduction, that it is a pleasure to read them. Few branches of natural history were there neglected, and his notes on mammals, birds, reptiles and insects, all of which are well illustrated, show Shelford's many-sided character. His anthropological notes towards the end of the volume are distinctly valuable. 'A Naturalist in Borneo' is one of the most interesting books we have read for some time.

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* 'Bird Watching,' pp. 207-8.

CUMBERLAND COLEOPTERA IN 1916.

F. H. DAY, F.E.S.

My field work last year was confined to about half a dozen short excursions in the immediate neighbourhood of Carlisle. So far as I could judge, it was not a good season for insects, being too cold and wet. Very few of my captures were above the common rank, but given more opportunity, I might have had more of interest to record.

At Durdar in April, *Haliplus fulvus* F., *Hydroporus lepidus* Ol., and *H. striola* Gyll. (*vittula* Er.), occurred in a freshwater pond, and an hour's work with the bark ripper on some felled pines yielded a few each of *Phlocopora testacea* Mann. (*reptans* Er.), *Stichoglossa* (*Ischnoglossa*) *prolixa* Gr., *Leptusa haemorrhoidalis* Heer. (*fumida* Er.), and *Phlococharis subtilissima* Mann. In ground moss, *Staphylinus* (*Ocypus*) *brunnipes* F., and *Quedius rufipes* Gr. were frequent.

On Rockcliffe Marsh in May, *Agabus conspersus* Marsh., was captured in a weedy creek, on the mud of which occurred *Ochthebius marinus* Pk. and others of the genus. The genus *Dyschirius*, for which these Solway marshes are famous, was only represented by *politus* Dj., and *salinus* Schaum. Few species of *Bledius* were about, but I was glad to get *longulus* Er. here for the first time.

My most productive outing during the year was to Thurstonfield Lough in June, a large sheet of fresh water with marshy surroundings. Here I got *Agabus unguicularis* Th., *A. labiatus* Brahm., (*femoralis* Pk.), *Rhantus exoletus* Forst., *Helophorus tenuensis* Shp. (new to Cumberland), *Hydrochus brevis* Hbst. (common), *Phyllotreta flexuosa* Ill., *Phaedon armoraciae* L., *Philonthus umbratilis* Gr., *Stenus melanarius* Steph., *S. binotatus* Ljun., *Bagous nigritarsis* Th., *B. claudicans* Boh., *Rhinoncus perpendicularis* Reich., *Phytobius canaliculatus* Fähr., *Litodactylus leucogaster* Marsh., *Eubrichius velatus* Beck., with many more species.

At Orton on the same day, *Corymbites pectinicornis* L., was noted in numbers on the wing in a meadow bordered by a large wood, and *Magdalis carbonaria* L. was swept. In the same month I paid one visit to the Nature Reserve at Kingmoor, when beetles were abundant. Most of the species have already been recorded (*The Naturalist*, 1915, pp. 238-240), but *Tychus niger* Pk., *Neuraphes angulatus* Müll., and *Gyrophaena affinis* Mann. were added to the list.

At Orton in July, while working for Hemiptera, I took an example of *Anisotoma* (*Liodes*) *orbicularis* Hbst. in the sweeping net, this being the first record of the species for the county. *Scymnus nigrinus* Kug. was beaten from Scotch fir, *Liopus*

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nebulosus L. from oak, *Anthophagus caraboides* L. (*testaceus* Gr.) from birch, and *Rhynchites nanus* Pk., and *R. mannerheimi* Humm. (*megacephalus* Germ.), from various trees.

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MOLLUSCA.

Varieties of *Helix nemoralis* L. in Notts.—I have received a number of varieties and modifications of *Helix nemoralis* which, judging from the lists in J. W. Taylor's 'Monograph of Land and Freshwater Mollusca,' and Prof. Carr's recent 'Invertebrate Fauna of Notts.' have not been recorded in this neighbourhood. I am much indebted to Messrs. W. D. Roebuck and J. W. Taylor for verifying examples of the varieties quoted. Shells recorded from 'Aspley' are from the lane near Aspley Hall, on the west of Nottingham, which appears to possess a very rich molluscan fauna.

var. *rubella* Pic. Very common. Aspley, Wollaton, Edwalton, etc.
  s.v. *violacea* Baud. 00000. Lane near Aspley.
  s.v. *albescens* Pic. Not uncommon. 00000. Edwalton. 00300 Aspley.
  Also some extremely pale specimens from Gotham.
  s.v. *carnea* Baud. Common. Aspley, Edwalton, Wollaton and Gotham.
var. *fascialba* Pic. Common in 00300. Aspley, Wollaton, Gotham and Barton Moors.
var. *roseolabiata* Kob. Fairly common at Aspley.
var. *bimarginata* Pic. Not rare. Aspley.
  s.v. *tenuis* Baud. Aspley. Relatively thin shells are not uncommon on the Bunter sandstone near Wollaton.

I have also noticed the following band variations in addition to those recorded by Prof. Carr :—

10345	in v.	*libellula*.	Gotham and Aspley.
02345	,,	,,	,,
1(2345)	,,	,,	Whitemoor.
1(23)(45)	,,	,,	Aspley.
$1_2$2345	,,	,,	Gotham.
12340	,, v.	*rubella*.	Gotham.

—Arthur E. Trueman, M.Sc., University College, Nottm.

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Mr. J. F. Musham has been elected President of the Selby Scientific Society.

At a recent meeting of the Lancashire and Cheshire Entomological Society, Mr. William Mansbridge described some 'Recent Experiments in breeding *Aplecta nebulosa*.' In these, he had a confirmation of an experiment in 1914 where var. *robsoni* was bred from moths of the typical form of markings. Attention was also directed to a recurring variation of a leaden-grey ground-colour, for which the name *plumbosa* was proposed.

THE SHELLS OF THE HOLDERNESS BASEMENT CLAYS.

ALFRED BELL.

So much has been written about the basement clay, its origin and contents, that another paper may be deemed superfluous after the comprehensive memoirs and works of Professor Phillips, and Messrs. Reid, Lamplugh, Drake and Sheppard amongst others.

A re-examination of the mollusca obtained from the Holderness Clay now in the museums of London, Cambridge, York, Hull, the private collection of Mr. Headley of Stamford, and some material in my own possession, has enabled me to revise and enlarge the published lists, with the kindly assistance of F. W. Harmer, Esq., F.G.S., who is also adding to the number in his memoir on the 'Pliocene Mollusca of Great Britain,' now in course of publication by the Palæontographical Society.

The shells as at present listed represent two zones of life, one dwelling between tide marks, and a deeper one reaching thence to beyond 1,000 feet. The late Dr. Jeffreys proposed to exclude most of those pertaining to the littoral zone, as not coming from the clay itself but from a more recent bed.

Some of the later gatherings have been taken at extreme low tides, and the specimens obtained are not above suspicion. Some that I have seen appear to be comparatively recent, or perhaps from an overlying muddy clay of no great age. Their number however is not great either in specimens or species; too few to interfere with the general result.

Some of these species do occur at great depths. Mr. Friele told Dr. Jeffreys that he had dredged *Mytilus edulis* and *Littorina rudis* in 350 fathoms in company with *Lima subexcavata*.

Of the 180 molluscs recorded below, at least 100 are no longer living south of the Shetlands, and the remainder, with a few doubtful exceptions, are all recorded by Sars and other writers from Arctic Norway. Jeffreys described a few new species from the Headley Collection but as since then, one (*Rissoa wyville-thomsoni*) has been found alive at great depths (1,250 feet), it is probable that the others, all small species, may be found some day.

Admete viridula Fabr.
A. viridula couthouyi Jay.
Amaura sulcosa Leche.
Amauropsis islandica Gmel.
Astyris rosacea Gould.
Bela angulosa G. O. Sars.
B. bicarinata Couth.
B. cinerea Möll.
B. decussata Couth.
B. decussata inflata Posselt (*Pl. simplex* Jeff. *non* Midd.).
B. dowsoni S. V. Wood.
B. elegans Möll.
B. elegantior S. V. Wood.
B. exarata Möll.
B. harpularia Couth.
B. multistriata Jeff.
B. nobilis Möll.

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Bela plicifera S. V. Wood.(?)
B. pyramidalis Ström.
B. pyramidalis semiplicata G. O. Sars.
B. robusta S. V. Wood.
B. scalaris Möll.
(*B. simplex* see *B. decussata*).
B. trevelyana Turt.
B. turricula Mont.
B. violacea Couth.
B. viridula Möll.
Buccinum inexhaustum Verk.
B. grœnlandicum Chemn.
Cemoria noachina L.
Fusus (see *Neptunea* and *Sipho*).
Hœdropleura rufa Mont. (?) (possibly *Bela pyramidalis*).
Helcion pellucidum L.
Lacuna divaricata Fabr.
Lepeta cœca Müll.
Littorina globosa Jeff.
L. littorea L.
L. obtusata Gmel.
L. rudis M. & R. (purchased).
Margarita grœnlandica Chemn. (see also *Solariella*).
Menestho albula Fabr.
Molleria costulata Möll.
Murex erinaceus L. (very doubtful).
Natica affinis Gmel.
N. grœnlandica Beck.
N. montagui E. F.
N. occlusa Wood.
N. tenuistriata Dautz. et. Fisch.
Neptunea contraria typica L.
N. contraria carinata Wood.
N. despecta L.
N. despecta carinata Penn.
N. spitzbergensis Reeve, *vide* Jeff.
Odostomia conspicua Alder.
Pleurotoma (see *Bela* and *Hœdropleura*).
Parisipho kroyeri Möll.
Purpura lapillus L.
Rissoa costata Ad.
R. parva Da Costa.
R. parva interrupta Ad.
R. semistriata Mont.
R. striata Ad.
R. subperforata Jeff.
R. wyville-thomsoni Jeff.
Scalaria grœnlandica Ch.
S. grœnl. crebricostata G. O. Sars.
Sipho attenuatus Jeff.
S. curtus Jeff (see Note B.).
S. exiguus F. W. Harmer.
S. gracilis Da Costa.
S. latericeus Möll.
S. leckenbyi Wood.
S. propinquus Ald.
Sipho pygmæus Gould.
S. sabini (in Wood. Crag Moll. = *S. exiguus*).
S. sarsii Jeff.
S. tenuistriatus F. W. Harmer (*T. ventricosus* Wood, *non* Gray).
Solariella cinerea Couth.
S. obscura Couth.
S. obscura bella Verk.
S. varicosa Mighels.
Trichotropis borealis B. & S.
T. insignis Midd.
Trochus (*Calliostoma*) *zizyphinus* L.
T. (*Gibbula*) *cineraria* L.
Trophon clathratus L.
T. fabricii Beck.
T. fabr. reticulata Harmer.
T. gunneri L.
T. truncatus Ström.
Turritella polaris Beck.
T. terebra L.
Bulla crebristriata Jeff.
Cylichna alba Brown.
C. scalpta Leche.
Utriculus constrictus Jeff.
U. obtusus pertenuis Gould.
Dentalium entalis L.
D. striolatum Stimp.
D. tarentinum Lam. ? (a doubtful identification).
Rhynchonella psittacea Chemn.
Anomia ephippium L.
Anomia ephippium aculeata Müll.
A. ephippium squamula L.
Astarte. Note C.
Astarte arctica Gray.
A. banksii warhami Hanc.
A. bennettii Dall. (Proc. Nat. Mus. U.S. vol. 26, pl. LXIII. f.6).
A. compressa globosa Möll.
A. compressa latior King.
A. ? compressa nana Jeff.
A. compressa striata Leach.
A. crenata Gray.
A. elliptica Brown.
A. elliptica ovata Brown.
A. elliptica crassa Leche.
A. placenta Mörch.
A. richardsoni Reeve.
A. semisulcata Leach.
A. semisulcata lactea B. and S.
A. sericea Posselt.
A. soror Dall (op. cit.).
A. sulcata Da. Costa.
A. withami Smith.
Axinopsis orbiculata G. O. Sars.
Cardita (*Venericardia*) *borealis* Conr.
Cardium echinatum L. (Dimlington).

Cardium edule L. (very doubtful; perhaps from Speeton).
C. islandicum L.
C. (*Serripes*) *grœnlandicum* Ch.
Corbula gibba Olivi.
*C. pusilla** Phil. *vide* Jeffr.
Crenella decussata Mont.
Cyprina islandica L.
Donax vittatus Da Costa (purchased)
Dosinia exoleta L. (S. Sea landing).
D. lincta Pult. (Headley Coll.).
Lima excavata Fabr. (York Mus.)
Lutraria elliptica Lam. (Filey).
Mactra elliptica Brown.
M. solida L.
M. subtruncata.
Modiola (*Volsella*), *modiolus* L.
Montacuta dawsoni Jeff.
M. bidentata.†
Mya arenaria L.
M. truncata L.
M. truncata uddevallensis E. F.
Mytilus edulis L.
Nucula nucleus L.
N. tenuis Mont.
N. tenuis inflata.
Nucula (*Acila*) *cobboldiæ* Sow. Note D.
A. insignis Gould.
Nuculana caudata buccata Steem.
Nuculana pernula Müll.
N. minuta Müll.
Ostrea celtica A. Bell. Note E.
Panomya norvegica Spengl.
Pecten islandicus Müll.
P. maximus L.
P. opercularis L.
P. pusio Penn.
P. septem-radiatus Müll.
Pectunculus glycimeris L.
Pholas crispata L.
Saxicava arctica L.
S. rugosa L. (*sulcosa* Smith).
Solen ensis L.
Tellina (*Macoma*) *balthica* L.
T. calcarea Chem.
T. obliqua Sow.
T. pusilla Phil.
Thracia pubescens‡ Pult.
T. prætenuis Pult.
Venus fluctuosa Gould.
V. ovata Penn.
Yoldia intermedia M. Sars.
Y. lenticula Möll.
Y. limatula Say (Jeff.).
Y. tenuis Phil.
Y. oblongoides Wood, *vide* S. P. Woodward.
(*Yoldia truncata* and *Y. oblongoides* are perhaps allied species).

Note A.—*Buccinum inexhaustum*:—Dr. S. P. Woodward, writing in 1865, could not refer the Bridlington Buccina to any of the ordinary recent forms of *B. undatum*. Mr. Headley has a large example in the clay matrix, but like so many of the Bridlington shells of other species, while retaining its form, is separated into many fragments.

It comes near to *B. inexhaustum*, with which I propose to identify it.

Note B.—*Sipho curtus*:—Which American shell Jeffreys had in view when creating this species it is impossible to say. He defines it as having a short spire, and as being *smaller*, and more tumid than the *Fusus gracilis* of the earlier Pliocene Crag as then understood, and a little later, when collating

* Jeffreys seems to have duplicated Phillips's reference in error. *Erycina* (*Tellina*) *pusilla* is the only one named in that author's book En. Moll. Sil.

† Inserted in the list of Bridlington Shells, by a mistake of Forbes *vide* S. P. Woodward, *Geol. Mag.*, Vol. I., p. 42.

‡ *T. pubescens*, recorded from Bridlington and Dimlington. These are very unusual localities for such a very S. W. English Channel species. *T. convexa*, another large species, occurs fossil at Portobello and Belfast; also in an elevated glacial deposit 400-500 (?) Drontheim. Sars figures other large Northern Arctic Thracias—*T. truncata* Brown, and a variety *devexa*, and I suggest it is to one of these the shell should be referred.

the Mollusca of Europe and Eastern North America, Ann. and Mag. Nat. Hist. 1872, p. 245, makes it the same as the much *larger F. islandicus* of Gould (*S. Stimpsoni* Mörch).

Some small shells bearing the name *F. curtus* in his own writing, contained in the Headley and Leckenby collections, represent very distinct species. Mr. Harmer tells me he has identified amongst them *F. pygmaeus* Gould, *Sipho exiguus* F. W. Harmer, and *Neptunea tenuistriata* F. W. H. (the *Fusus curtus* var. *expansa* Jeffr.). Two of the Headley fragments so named I find agree with *F. attenuatus* Jeff. (Sykes, Proc. Malacol. Mag., IX., p. 377 (figure), 1911), and another with *S. latericeus* as figured by Sars, Möll Reg. Arct. Norveg. pl. XV., fig. 8.

Mr. Harmer (Pliocene Mollusca) has adopted Jeffreys' name for a group of Crag Shells and Mr. Friele uses it for a number of other North Sea Siphos. One of these, figured by Wood as *Trophon leckenbyi*, is correlated by Jeffreys with his *Fusus turgidulus*, but the identification is not satisfactory.

Fusus sabinii vide Woodward (in Brit. Mus.), Jeffreys also correlates with *F.* (*Neptunea*) *spitzbergensis* Reevz.

NOTE C.—*Astarte*: —Forbes and Hanley and Jeffreys agree upon the extreme range in variation of the different members of this difficult genus and I have thought it better to give the Bridlington shells, numerous as they are, the names whether they are specific or varietal that have been assigned to their representatives elsewhere; and as Dr. Dall says, writing in 1902 upon this genus in the Proc. Nat. Mus., Washington, XXIV., p. 934. "Whether these be regarded as species or not, we have the satisfaction of knowing what we mean when we employ a name."

All the forms referred to live considerably within the Polar Circle. The periostracum on two of my specimens is fairly well preserved and shows definite colour stripes, radiating from the apex to the ventral edge, a somewhat unusual feature in these shells.

(*To be continued*).

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The Manufacture of Historical Material, by **J. W. Jeudwine.** London, Williams and Norgate, 268 pp., 6s. net. This is 'an elementary study in the Sources of Story.' In this remarkably scholarly volume, the author traces the evolution of the method of supplying, conveying and recording news. In the early days, its transmission by song and tradition was necessarily unreliable, and the author gives many instances of the faulty nature of early history. He appeals for more reliable methods of recording. 'There is a plaintiff and defendant in every cause, and neither holds the whole of the truth.' [The author speaks as a Barrister-at-Law!] 'If you take the monastic view that one man in any age controlled affairs because he was unutterably bad, or impossibly saintly, you lose sight of the causes, spiritual, physical and commercial, which regulated the happening of history.'

YORKSHIRE MYCOLOGISTS AT BUCKDEN.

A. E. PECK.

THE Autumn Fungus Foray of 1916, organized by the Mycological Committee of the Yorkshire Naturalists' Union, was held at Buckden, in Wharfedale, from September 23rd to September 29th.

An excellent attendance of Members and friends included Harold Wager, D.Sc., F.R.S. (Chairman), W. N. Cheesman, J.P., Alfred Clarke, Geo. Massee, V.M.H., Thos. Hebden, C. H. Broadhead, M. Malone, R. Fowler Jones, J. Ackroyd, Miss

Photo by] [*A. E. Peck.*

A. Wallis, A. E. Peck, Mrs. Greevz Fysher, Mr. Greevz Fysher, T. Hebden, T. Hey, T. Smith, R. Fowler Jones, Miss C. A. Cooper, W. N. Cheesman, Harold Wager, Geo. Massee, Alfd .Clarke, W. B. Haley. M. Malone.

C. A. Cooper, Anthony Wallis, M.A. (Penrith), Thos. Hey (President Midland Railway Naturalists' Society), Thos. Smith (Alderley Edge), Mr. and Mrs. Greevz Fysher (Leeds), Wm. Bellerby (York), W. B. Haley (Cleckheaton), J. Hartshorn (Leyburn), and A. E. Peck, Secretary.

Headquarters were at the Buck Inn. Fine weather favoured the proceedings throughout, and this, together with the capital muster, the comfortable quarters, the charming and romantic surroundings, and the abundance of interesting specimens, contributed to make the gathering both successful and eminently enjoyable. The Naturalists were further favoured in having

the kindly co-operation of the Rev. R. F. Anderton, Vicar of Hubberholme, who was good enough to place the excellent schoolroom at Buckden at the visitors' disposal for the evening lectures. To him thanks also are due for providing the lantern, for his personal and genial presence at these gatherings, for his kind words of welcome to the district spoken on behalf of the inhabitants, and for general interest and cordial help throughout the visit.

Mr. Anderton also conducted a party over his ancient Church of Hubberholme, pointing out its highly interesting antiquities, after which Mrs. and Miss Anderton entertained the party to afternoon tea at the Vicarage. Small wonder, then, that responsive sentiments of acquiescence were manifest when the Vicar made a touching plea for a second Mycological Survey of this district. His 'Wull ye no come back again?' will long be remembered.

Landowners who had thrown open their estates to investigation were:—Miss E. A. Crompton-Stansfield, Mrs. Hird, Mr. O. Lodge, Mr. J. E. Dinsdale and Mr. John Beresford.

Collecting began on Saturday morning, and during the day many baskets and boxes of interesting specimens were brought to the workroom. It was soon apparent that the district was going to prove well worthy of the visit of investigation now accorded it, as species were early recorded which were now seen for the first time by members present.

Agarics were in preponderance, while Polypores were by no means numerous. The district appears to be singularly free from tree parasites. *Polyporus squamosus*, which has an almost universal range, was never recorded, whilst *P. betulinus* was only met with on either one or two birch trees. *Fomes annosus*, extremely common about the base of conifers in some localities, is here quite rare. On the other hand, *Armillaria mellea* is of frequent occurrence, and many big and luxuriant patches came under observation.

Mr. Wallis, a new member of the Committee, had the good fortune to pick up specimens 'New to Britain' on this, his first 'Foray.' He and the writer were passing along a woodland path when Mr. Wallis gathered some pretty agarics of lilac colour which the writer at once recognized as new to him, but had no difficulty in relegating to the genus *Lepiota*. The specimens were tenderly dealt with until the workroom was reached, when a very short reference to Massee's 'European Agarics' sufficed to establish the new find as *Lepiota lilacea* Bresedola, an addition to the British flora.

A subsequent new British record of more than common interest was the pink-spored agaric *Nolanea vinacea* Fr., easily distinguishable by the delicate yellow colour of the stem.

Another 'pink-spored' form, *Entoloma ardosiacum*, though

only now first recorded for Yorkshire, proved anything but rare hereabouts, and the rich colouring of these specimens was much admired. Dr. Wager mentioned that he had observed this species many times in this district during the past two or three years.

The chief work at the tables was undertaken by Messrs. Massee and Clarke. Specimens of resupinate fungi were forwarded to Miss E. M. Wakefield, F.L.S., of Kew, who kindly undertook to deal with this rather difficult group. Her list includes 17 species, of which two *Odontia farinacea* (Pers.) Quel., and *Tomentella fusca* (Pers.) are first British records.

Mr. Cheesman, as usual, dealt with the Mycetozoa, and writes as follows respecting them :—' It is somewhat remarkable that, although the specimens were " few an' far between," the total number recorded is larger than that of any previous foray. This large number may be accounted for by the dissimilar working grounds, and the varied nature of tree and plant life in the district.

The most noteworthy species are *Physarum straminipes* Lister (second Yorks. record), a newly-made but distinct species with straw-coloured stalks and cross-like markings on the spores. *Mucilago spongiosa* Morgan was found on the bleak, wind-swept hill top, and had crept nine to twelve inches up the grass stems before completing its life cycle, and *Badhamia utricularis* which covered a fallen ash trunk many square feet in area, with its unbroken sporangia, like miniature bunches of grapes. No new county record is made, but those marked * are new to Mid West Yorks.'

Ceratiomyxa fruticulosa Macbr.
Badhamia utricularis Berk.
Physarum psittacinum Ditm.
P. viride (var. *aurantium*) List.
**P. straminipes* Lister.
P. cinereum Pers.
P. nutans Pers.
**P. sinuosum* Weinm.
Craterium minutum Fries.
Leocarpus fragilis Rost.
Fuligo septica Gmelin.
Didymium difforme Duby.
D. squamulosum Fries.
Mucilago spongiosa Morgan.
Stemonitis fusca Roth.
G. flavogenita Jahn.
Comatricha nigra Schroe.
C. typhoides Rost.
**Amaurochaete fuliginosa* Macbr.
Cribraria aurantiaca Schrad.
C. argillacea Pers.
Tubifera ferruginosa Gmel.
Reticularia Lycoperdon Bull.
Lycogala epidendrum Fries.
Trichia affinis de Bary.
T. scabra Rost.
T. varia Pers.
T. contorta Rost.
T. decipiens Macbr.
T. Botrytis Pers.
Hemitrichia vesparium Macbr.
H. clavata Rost.
Arcyria ferruginea Sauter.
A. cinerea Pers.
**A. pomiformis* Rost.
A. denudata Sheldon.
A. incarnata Pers.
A. nutans Grev.
Perichaena corticalis Rost.

Mr. Hebden worked the district for Lichens and an excellent list of his discoveries is appended hereto :—

Lempholemma myriococcum Ach. Wet moss.
Collema granuliferum Nyl. Walls.
C. melaenum Ach. Walls.
Leptogium scotinum var. *sinuatum* Mall. Moss.
Cladonia pyxidata var. *lophyra* Ach. Hill tops.
C. furcata var. *adspersa* Ach. Stony places in moss.
C. furcata var. *scabriuscula* Nyl. Stony places in moss.
C. fimbriata var. *tubaeformis* Fr. Mossy banks.
C. digitata var. *monstrosa* Nyl. Rotten wood.
Ramalina farinacea Ach. Bark.
Platysma glauca Nyl. Wall tops and bark.
Evernia furfuracea Fr. Wall tops.
Parmelia saxatilis Ach. Bark.
P. scortea Ach. Walls.
P. sulcata Tay. Bark.
P. fuliginosa Nyl. Bark.
P. physodes var. *tubulosa* Mudd. Wall tops.
Peltidea apthosa Ach. Damp rocks.
Solorina saccata Ach. ,,
Peltigera rufescens var. *praetextata* Hk. Mossy banks.
P. horizontalis Hoff. ,,
Physcia parietina var. *congranulata* Cr. Wall tops.
P. pulverulenta var. *panniformis* Cr. Bark.
P. stellaris var. *leptalea* Nyl. Walls.
Placodium sympagea Nyl. Walls.
Leproplaca xantholyta Nyl. Rocks.
Lecanora hæmatites Nyl. Bark.
L. irrubata var. *calva* Nyl. Stone.
L. subfusca var. *campestris* Nyl. Stone.
L. rugosa Nyl. Bark.
Aspicilia calcarea Nyl. Walls.
A. calcarea var. *contorta* Nyl. Walls.
Pertusaria lactea Nyl. Walls.
P. globulifera Nyl. Bark.
P. velata Turn. Stone.
P. communis var. *rupestris* D.C. Stone.
P. scutellaris Huc. Stone.
Gyalecta cupularis Sch. Damp rocks.
Lecidea albo-coerulescens Nyl. Rocks.
L. lurida Ach. ,,
Bilimbia squamulosa A.L.S. Wall Tops
Rhizocarpon calcareum Fr. ,,
Opegrapha confluens Stiz. Rocks.
Verrucaria limitata Krmp. ,,
Polyblastia intercedens Lönn. ,,
Thelidium immersum Mudd. ,,

(*To be continued*).

OBSERVATIONS ON RANUNCULUS FICARIA.

MARY A. JOHNSTONE, B.Sc., F.L.S.

One of the most curious features of the morphology of the Lesser Celandine (*Ranunculus Ficaria*) is the duplicated grouping of tuberous roots, a duplication, the occurrence of which is limited to certain plants.

The simpler type of plant possesses only the underground tuberous organs. Below ground it consists of a much abbreviated stem region, a few ordinary absorptive roots and a crowded cluster of pear-shaped storage roots, together with, at certain times, the remains of the tubers of the previous season. From the top of the buried stem arise one or more branching aerial stems, bearing scale and foliage leaves; a varying number of radical leaves may also spring from the same region; flowers are borne apparently terminally on the branches.

In the more complicated plant, additional tuberous bodies arise in the axils of the cauline leaves; these also are modified roots. When present at all, they occur in the axil of every leaf, the number at any level varying from one to about nine. When the plant dies down in June, the tubers, together with the minute bud to which they are attached, drop to the ground along with the decaying leafage. There they may develop as independent plants, and they thus constitute a well-known example of vegetative reproduction. They are interesting in many ways, but the only point upon which I wish to touch now is the relationship of the plants that bear them to those of the first group, and the relationship of both to their surroundings.

The commonly accepted theory is that plants bearing aerial tubers are restricted in their occurrence to deeply shaded situations, from which flower-bearing plants are in their turn absent. The absence of flowers is considered to be correlated with the infrequency of insect visits in such quarters, reproduction being provided for by the vegetative structures in the leaf axils. Whilst acknowledging the existence of of a sufficient amount of evidence to account for such a generalisation having been put forward, I think, after comparing together a very large number of habitats, that the explanation does not account for the actual distribution of the plants, and I should like to record a few out of many instances where I have considered it to fail.

A word first about those specimens which bear aerial tubers. The most significant distinguishing characteristic is the great reduction in the number of flowers produced, and in the number of carpels on these few flowers; in some colonies,

yards in extent, not a single flower is to be seen. The number of leaves is often unusually great. Very often an abundance of aerial tubers is associated with a very vigorous growth of underground tubers. I have found, in all cases, that if tubers are present at all, every leaf possesses one or more. The size and habit of the plant vary greatly—from the one extreme in which aerial internodes are unlengthened, and the leaves with their tubers cluster on the ground in rosette fashion, to the other, in which the long-branched, straggling plants are exaggerated in length in every part, including the tubers. The rosette condition is unusual. Root hairs are scattered in the usual way over the surface to within a short distance of the tip; they are preserved from shrivelling as long as they are enclosed within the sheathing leaf-bases, and when they emerge, as they sometimes do, into protected chambers, formed by over-arching leaves.

The two habitats first to be described form a complete contrast, and if they were considered alone, or if they were representative of all others, they would fully justify the idea that light and shade explained all differences.

The first is the grassland association, of which *R. Ficaria* may be a very conspicuous member. In this, which is the most exposed situation possible, I have never found a single aerial tuber. The grassfield Celandine has adopted the rosette habit of many of its grass-field associates; its parts are dwarfed; its stems and petioles are prostrate, or nearly so; the flowers are small; the whole arrangement is compact, both above and below ground. As one of a closed and highly competitive community, it has adapted itself to the struggle, and the aerial tuber evidently is not the means of survival upon which it depends.

As a complete contrast to the field may be given a steep slope in a deciduous wood, with a ground covering of leaves, through several inches of which the celandine had to push its way The illumination was not good. All parts, even the tuber, were greatly attenuated. Aerial tubers were very numerous; they were cylindrical, approximating to ordinary roots; they and their etiolated stems were so deeply imbedded amongst herbage that they were practiclly underground. Flowers and fruits were very scarce.

Such instances as the above might be regarded as conclusive, but they do not represent the whole case. It is true that deep shade may not favour flower production, but it is also true that tuber production is by no means limited to shade condition. I have found (excepting the grass land) very few situations of any size where tuber-bearing individuals did not flourish alongside flower-bearing. I outline below a few such habitats: they were not solitary instances, but are typical.

(*a*) This was a sloping bank, fairly well shaded and bore little vegetation other than *R. Ficaria*. Almost all the plants were of small size, possessed numerous leaves, few flowers and many tubers. Intermingled with these and standing up above the surface of the bed like comparative giants were solitary plants of much handsomer appearance. Their flowers were large and brilliant ; tubers were absent. Whilst the average height of the majority in the bed was about three inches, the measurements of the stragglers were on the scale of the following example :—

From bottom of main internode to top of central flower	..	..	..	10 inches.
Length of peduncle	..	..	..	7 ,,
Diameter of flower	..	..	..	1·8 ,,
Diameter of leaf	..	..	..	2·0 ,,

In their isolation they were very striking, suggesting the idea of a variety other than that of their surrounding relatives, or that they had reached a more advanced stage in their life-history.

(*To be continued*).

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MAMMALS.

Mammalian Remains, etc., from the Holderness Gravels.—Among some fossil bones recently obtained from Kelsey Hill, received from Mr. T. Sheppard, on January 25th, 1917, (and returned), are the following :—

Bison or Bos.—Probably *Bison*, as this has already been recorded. Parts recognised—Humerus (large), metacarpal, calcaneum, astragalus, tooth, horn-core, vertebræ.

Red Deer (*Cervus elaphus*).—Piece of antler tyne and piece of ilium.

Reindeer (*Rangifer tarandus*).—Antler, basal portion.

Seal (*Phoca vitulina* ?).—Two tibiæ.

Fish Vertebræ.—Probably Codfish.

The seal and red deer are not recorded in Reid's ' Geology of Holderness,' but have subsequently been recorded in *The Naturalist* (May, 1913, p. 197) and ' Geological Rambles in East Yorkshire ' respectively.—E. T. Newton, January 30th, 1917.

—:o:—

Mr. R. W. Goulding favours us with an interesting illustrated pamphlet on ' Louth Parish Church,' being a paper read before the Louth Naturalists' Antiquarian and Literary Society recently. It enumerates many interesting events in connection with the church, from which we notice that in 1693, a raven built her nest at the north-west pinnacle, and that in 1897, a Cormorant was seen several times on the top of the spire. It was subsequently shot at Tathwell. With regard to the raven record, we should assume that the chronicler meant a rook.

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(To be continued).

In Memoriam.

THOS. SCOTT JOHNSTONE.

The death occurred at Carlisle on February 5th, at the age of fifty-three, of Thos. Scott Johnstone, Vice-President of the Carlisle Natural History Society, and a former President. His interests were many and varied. He was connected in one way or another with the several Scientific Societies existing in the border city.

It is as a botanist, however, that he chiefly merits claim to notice here. Naturalists in all branches of study have always been few in Cumberland, botanists fewest of all, and in the Carlisle district Johnstone was practically alone in his studies in recent years. During its existence of twenty-three years, he was almost the only member of the Carlisle Natural History Society who specialised in phanerogamic botany. Having the field to himself, practically everything of botanical note in the area in question was the result of his investigations. Centred in a fertile plain, as yet but little affected by the adverse influences of industry, he had ample scope for his researches. Rural lanes, moss, and woodland are within easy reach of Carlisle, while equally accessible the salt marshes and sand hills of the Solway Firth were the scene of many noteworthy finds.

As a result of many years of study, he amassed notes of the greatest value on the Carlisle Flora, and also formed a select and carefully prepared herbarium, which it is hoped will eventually be placed in the Carlisle Museum. Of a naturally retiring disposition, it is a matter for regret that he published little. He, however, contributed several important papers to the Carlisle Society on ' Plant Life around Carlisle,' which are published in the Society's Transactions, and also on ' Rare Cumberland Plants,' which will eventually be published.

Latterly, he devoted much time to tabulating and arranging the botanical notes in the diary of Bishop Nicholson, who held the See of Carlisle over two hundred years ago. The diary, which is dated 1690 and is in manuscript, is preserved in the Archives of Rose Castle, the episcopal residence. These notes naturally contain many puzzles in nomenclature, but by much patient labour, Johnstone overcame them and completed his transcription some little time before he died. This, it is hoped, will form the subject of a posthumous paper to the Carlisle Society. On the formation of the Cumberland Nature Reserve Association in 1913 he entered into its work with zeal and energy.

On the acquirement of Kingmoor Common by the Association, he was appointed its botanical recorder, and his first list of the Flora was published in *The Naturalist* in 1915, pp.

240-243. Living within easy walking distance of Kingmoor, he spent much time there and extended the list considerably. He was a strong advocate of leaving Kingmoor in its natural state. Anything in the way of proposed draining or levelling, which would tend to destroy the character of the place, found in him a vigorous opponent. His desire was to see things revert to primitive wildness unassisted by the human hand of improvement.

His death leaves a conspicuous gap in the ranks of Cumberland Naturalists, and the Carlisle Society has lost an irreplaceable member. He leaves a widow and two daughters.—F.H.D.

——: o :——

The Correct Arms of Kingston-upon-Hull, by **T. Sheppard, M.Sc., F.G.S.** Hull, A. Brown & Sons. 54 pp., 2s. 6d. net. Mr. Sheppard tell us that five years ago, he read a paper, which was duly published, on the Arms of Hull, in which he appealed for uniformity in the use of the city's arms, and he gave what he considered to be the correct arms, this being the earliest representation known. Over four years later a well-known architect in Hull wrote a book on 'The Arms of Hull,' in which he said that Mr. Sheppard's representation was 'incorrect,' and that several which

An early dispute in connection with Arms: from an old Anglo-Saxon manuscript.

Mr. Sheppard said were incorrect, were correct. We don't know much about arms, but we do know something about Mr. Sheppard. His reply, in the present volume, is what we might have expected. He has reprinted his original paper, which is a distinct contribution to local history: and then says something about the volume written by his critic. That 'something' is very amusing—very caustic, and, well—we are glad to think that we know better than to roughly handle Mr. Sheppard. One of the fifty illustrations is reproduced herewith, and is fairly typical of the tone of the volume, which is well bound and in keeping with the same author's 'Lost Towns of Yorkshire' and 'Yorkshire's Contribution to Science.'

Part 5 of **A Bibliography of British Ornithology,** by **W. H. Mullens** and **H. Kirke Swann** (MacMillan & Co., pp. 497-624, 6s. net), contains biographies from 'J. B. Rowe' to 'H. W. Wheelwright,' and includes the names of many contributors to *The Naturalist*. We cannot refer to all those enumerated in this section of the Bibliography, but the ornithological work of the following writers is mentioned:—John Ruskin, Sir E. Sabine, Howard Saunders, P. L. Sclater, Henry Seebohm, P. J. Selby, Robert Service, W. Shakespeare, R. Bowdler Sharpe, Thomas Sheppard, A. E. Shipley, Sir Robert Sibbald, T. Southwell, J. Sowerby, C. Stonham, H. K. Swann, W. B. Tegetmeier, A. Thorburn, N. F. Ticehurst, J. G Tuck, M. Tunstall, W. Turner, E. W. Wade, C. Waterton, W. M. Webb, H. W. Weir and W. P. Westell. Many of these names will be familiar to our readers. Quite a large proportion were, or are, contributors to our journal, though we cannot claim Shakespeare nor Ruskin.

Nature Study Lessons Seasonably Arranged, by **J. B. Philip.** Cambridge University Press, 147 pages. 2s. 6d. net. This book belongs to a class which should never be written—a nature study book to be placed in the hands of children. 'Nature Study' should be a study of nature, not of somebody's talk about it. There is nothing in the book to commend it to anybody. In his preface, the author claims a sequence for his lessons; it goes no deeper than talking about fruits in autumn, flowers in summer, and germination in spring. There is an amazing lack of grasp of the mental capacity of a child of eleven to fourteen betrayed in the choice of subjects and the range of questions. If it is profitable to stimulate a child's intellect by telling it that the stalk of an apple performs two services—first to fasten the apple to the tree and second to enable it to drop off—it is surely far beyond the same child's powers to investigate in detail the structure of a cocoa-nut, discover its 'homologues' as compared with the apple, and in turn compare the latter with the orange. Will a twelve-year old really follow the reasoning which goes to show that the dots in the pulp of the apple are 'vestigial structures?' The book is said to represent a session's work; the first chapter alone *describes* all the physiological processes of plant life, and, from the material of four Snapdragon plants supplied to the Class, elicits information not only about every normal plant organ, but about spines, tendrils, suckers, stings, flower sheaths. As examples of some of the exercises set, the following are typical:—(1) Write the names of the red and yellow paints in your paint box. (2) Pound an apple stalk in a mortar, tease the material out in water, examine under a microscope to detect the sap-tubes. (3) How are shop-window apples polished? (4) Make a microscopic examination of the green substance in the interior of a cabbage leaf. Are both types of question sensible? The writer is very fluent.

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We notice the price of two of our monthly entomological magazines is now 9d. net per month.

In *Animal World* for February is an illustrated note on 'Swans and Swanneries,' by F. M. Burton.

The Journal of Conchology for January contains a part of the Presidential Address of Mr. R. Standen 'On the Calcareous Eggs of Terrestrial Mollusca.'

Three interesting abnormalities of the beetle *Prasocuris junci*, from Barnard Castle, are recorded in *The Entomologist's Monthly Magazine* for February.

The *Quarterly Journal of the Geological Society for* 1915 contains four parts, one of which was issued in September, 1915, two during 1916, and one in January, 1917.

In *The Zoologist* for December, the editor informs us that the necessary increased support from subscribers has not been forthcoming during 1916; consequently the publication ceases.

We regret to record the death of Mr. Harvy Sheppard, F.E.I.S., headmaster of the Craven Street Higher Grade School, Hull, at the age of 66. He was the pioneer of Science teaching in Hull.

In the *Quarterly Journal of the Geological Society*, No. 284, Messrs. W. H. Wilcockson and R. H. Rastall write on 'The Accessory Minerals of the Granitic Rocks of the English Lake District.'

The Board of Agriculture and Fisheries has issued three special leaflets Nos. 67-9, dealing with 'Economy in using Potatoes,' 'Hints on Purchasing "Seed" Potatoes,' 'The Culture of Early Potatoes Under Glass.'

The Annual Report of the Spalding Gentlemen's Society for 1916, contains particulars of many valuable additions to the Society's Museum and Library, and we are glad to notice particular attention is paid to the objects relating to the Spalding district.

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A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND

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AND
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JUN 24 National Museum

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NOTES AND COMMENTS.

A YORKSHIRE FLOOD.

We have recently obtained an interesting coloured print, measuring 14¾ ins. by 9¼ ins., entitled 'Bursting of the Bilberry-Dam Reservoir at Holmfirth, near Huddersfield, on the night of Wednesday, February 4th, 1852, thereby causing an awful loss of human life, and destruction of property to an immense amount.' It shows the waters rushing from the reservoir on the hill top, many of the houses being almost entirely submerged, while floating about in the flood are quantities of chairs and

Bursting of the Bilberry-Dam Reservoir at Holmfirth, 1852.

tables, and in the foreground, three human bodies. The plate is reproduced herewith on a smaller scale.

OTHER YORKSHIRE FLOODS.

The following notes on this and other floods are taken from C. P. Hobkirk's 'Huddersfield: its History and Natural History,' Second edition, 1868:—'As might be expected from the situation of Huddersfield—being hemmed in on all sides by high hills—there have been several disastrous floods in the valleys. In 1799, several mills and houses were swept away between Holmfirth and Huddersfield by a flood. In 1815, a large water spout was seen at Marsden, after which followed a most terrible and destructive tempest. The bursting of the Standedge reservoir was another disastrous calamity, as also the bursting of the Black Sike Mill reservoir, on the 21st September, 1820, which occasioned an immense loss of

property, but happily no lives were lost. The most awful event of this character was the bursting of the Bilberry reservoir, three miles above Holmfirth, on the morning of the 5th February, 1852. During the week previous to this date, there had been almost incessant rain, and every streamlet was swollen into a torrent.

THE BILBERRY RESERVOIR.

This reservoir, which was fed by these streams, was unusually full; indeed, it is calculated that when the embankment gave way, there was not less than "86,248,000 gallons of water in it, or the enormous and fearful amount of 300,000 tons in weight." The rain had ceased, and the moon shone out bright and clear over one of the most lovely valleys in England; the tired and weary labourers were all enjoying their sweet repose, oblivious alike of toil and danger, save a few who had serious apprehensions for the safety of the embankments, and who stood on the hills above contemplating the quiet scene, when about one o'clock the vast mass of water burst its bounds, and rushed down the valley with the voice of ten thousand thunders, carrying death and destruction in its headlong course. Factories, bridges, trees, and even villages were but as straws before its surging front; boilers, vats, and utensils of all descriptions floated down on the rushing wave, and were deposited many miles from their original situations. The scene presented, when daylight appeared, was harrowing in the extreme—more particularly at Diglee Mill, which had borne the first brunt of the rushing waters. The tall chimney twice bent like a willow to the force of the current, but it finally resisted the attack, and stood a solitary monument, amid the wide-spread desolation. No less than eighty-one persons perished on this awful night; property to the amount of nearly £200,000 was destroyed, and seven thousand artisans were thrown out of employment.'

BIRD 'STUFFERS'

Referring to the paper 'On arranging Museum Cases for Birds' in our February issue, a 'taxidermist of 33 years' standing,' who is a well-known Yorkshire *naturalist*, writes at some length, more in sorrow than in anger. But our remarks on the weird ways of 'country stuffers' were not intended to apply to the scientific taxidermist; and after all, they were more or less introductory to the main grievance we had, viz., the lack of system adopted by both 'stuffers' and 'taxidermists' alike, in regard to the dimensions of the cases. To some extent our correspondent confirms the opinion we expressed as to the desirability of a definite standard: he gives the reasons why there are not, some of which we know. Anyway, if people ordering and paying for the cases insist on certain sizes, possibly they would get them.

V. TAXIDERMISTS.

Our correspondent says, 'It is well known, and has been a sore point for many years, the lack of protection in the trade; anyone with only the crudest ideas of anatomy and general effect, could 'set up' for himself in a back room, generally without capital, and turn out goods at a small charge, because his materials were rubbish and his knowledge the same. This takes with a large section of the public who wish work done for the lowest amount, irrespective of getting value for money; and doubly fostered by the popular belief that stuffers are perfect 'Shylocks' in their charges, and the undoubted fact that, at sales, 'stuffed' birds, no matter how mounted, are in little demand, and only fetch a fraction of their original cost. Thus, in time, these examples gravitate to local museums as an emporium for goods unsaleable*; hence the oddity of finish and size of case so apparent when a crowd of them is so gathered together. Many of our rarest birds and museum specimens were mounted at a time when Taxidermy was in its infancy, and the demand by the then owner (who never studied the ethics of surroundings) for something showy, all helped to produce what, in the aggregate, we now with more cultured eyes look upon with pity.'

THE SIZE OF CASES.

'The different sizes of cases is a foregone conclusion, as their occupants vary in size—and so did the original owners' pockets when ordering; if all in 'the trade' had only been given *carte blanche*, a different tale would† now be told. Glazing varies according to individual styles, each tradesman adopting a different style, etc. When I was in business, all my ordinary cases were made of the best quality yellow-pine wood to templet, and were sawn out and dressed in batches, each top, bottom, side and back were made in exact pairs; glazing, English sheet-glass, 'Belgian' and 'old crown' distorts. A subdued effect of sky and distance was painted on the back in distemper, and each subject 'trimmed' with the moss, grasses or pebbles common to the habitat of each individual. Now, when this had to be done in many instances in competition with some amateur, who was cutting you in his spare time, it is easy to see why so many of these goods show cases too small, and inferior workmanship.'

CLASSIFICATION.

'Again, classification as to species does not come in to the head of the ordinary householder, who requires, perhaps, two quite diametrical subjects mounting, and orders the size of

* It does not follow that any or all are exhibited. Most museums have a big cellar.—ED.

† *i.e.* might.—ED.

the case probably to go, when finished, on some pet bracket, or convenient niche in his house, of which the 'tradesman' who mounts it knows nothing beforehand; if a rare bird, it probably ends its days in a museum, another oddity in case, size and mount. No! it is not always the fault of the taxidermist first concerned that museum acquirements are often such incongruities; I have had customers order impossible landscapes, foreign butterflies, and exotic marine shells in cases of British subjects, because! one expense would do for the lot; a country 'stuffer' cannot always shape his cloth, with the money staring him in the face. Yes—latitude now must be given, and many museum acquirements must be looked at through spectacles of say fifty years ago; and so must be rearranged to modern ideas, thankful that the older hands did their best.'

HAIR CUT AND BIRDS STUFFED.

'One example of the trials of a 'decent' man in the trade, and I have done. I was once told by a person in a high position in life, that my work was too dear, as he could get in his local town the same done for 4/6 that I was charging 7/6 for. I told him that if the lower price and work was satisfactory, to go there in future. A year or two later, I was in the same town, and looked up this cheap 'stuffer.' I found he was a barber and hairdresser, who did such work in his spare time; needless to say the finished job was a monstrosity.'

SIEGLINGIA DECUMBENS.

The Rev. E. A. Woodruffe-Peacock has a note on '*Sieglingia decumbens* in Lincolnshire,' in *The Journal of Botany* for December, pp. 359-360. The species was first recorded for Lincolnshire in 1851, by H. C. Watson. It is found in ten out of the eighteen divisions; but the heath-peat upon which it occurs, however thin, must be limeless, and for certain months of the year fairly moist. It is distinctly a damp-loving species, but not a 'lime-water lover.' The plant has not been recorded for Lincolnshire for carr-peat, though the writer cannot say why.

SCIENCE PROGRESS.

We have received the January number of this interesting quarterly journal, which is edited by Sir Ronald Ross, and published by John Murray (pp. 361-544, 5s. net). It contains original articles, reviews, summaries of recent advances in various branches of science, etc. There is also an admirable 'Essay-review' by the editor, who refers to recent poems by Masefield and Gollancz. Sir Ronald Ross gives an account of a visit to the Valley of the Muses on Mount Helikon. 'There, in the old days, I thought, men were wise enough to worship, not this Muse or another, but all the Muses; for their temple was

one, and, really, the worship of them is one .... After all, polytheism is the true faith. Let us therefore not sink to the condition of the present monotheistic occupants of that divine valley: huge fat black people, grunting after the fruits of the earth; or lean, long-eared eloquent people, braying their wisdom at the eternal hills; or great tortoises sunning themselves into life among the broken marbles of the past. Let the lovers of art spare roses for the altar of science, and the lovers of science lilies for the shrines of the arts; and we shall all find sufficient asphodel, at least, everywhere about us, for both.'

THE PILTDOWN JAW.

Mr. W. P. Pycraft writes on 'The Jaw of the Piltdown Man; a Reply to Mr. Gerritt S. Miller.' Mr. Miller, of the Smithsonian Institute, Washington, who has not seen the actual remains from Piltdown, but has been supplied with plaster casts, is apparently convinced that the Piltdown skull is human, while the jaw is that of a chimpanzee. Mr. Pycraft, whose excellent work in reference to the Archæopteryx will be remembered, deals with Mr. Miller's arguments in detail. By the time Mr. Pycraft has finished it is apparent that Mr. Miller's opinion is not one that will have much weight in the scientific world. 'A very brief study of his arguments will show that they are based on assumptions such as would never have been made had he not committed the initial mistake of overlooking the fact that these remains are of extreme antiquity, and hence are to be measured by the standards of the palæontologist rather than of the anthropologist.'

ANOTHER EOANTHROPUS DAWSONI.

Probably no greater proof of the accuracy of Dr. A. Smith Woodward's conclusion with regard to the nature of the Piltdown remains could be desired, than the recent further discovery of similar remains, a mile from the first pit examined, which are unquestionably of another individual of the same species. These were described at a recent meeting of the Geological Society by Dr. Woodward. He reports that: Excavations last summer round the margin of the gravel-pit at Piltdown (Sussex) supported the conclusion that the deposit is a varied shingle-bank, and that the three layers containing Palæolithic remains and derived Pliocene fossils are approximately of the same age. Many elongated flints and pieces of Wealden sandstone were observed in the bottom sandy clay with their long axis more or less nearly vertical. No teeth or bones were found, but one nodular flint obtained from the same layer as *Eoanthropus*, seems to have been used by man as a hammer-stone. This is not purposely shaped, but merely battered along faces that happened to be useful when the stone was conveniently held in the hand.

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DETAILS OF THE NEW DISCOVERY.

In the winter of 1915 the late Mr. Charles Dawson discovered in a ploughed field, about a mile distant from the original spot, the inner supraorbital part of a frontal bone, the middle of an occipital bone, and a left lower first molar tooth, all evidently human. These are rolled fragments, and the first and third may be referred with certainty to *Eoanthropus dawsoni*; but it is doubtful whether they represent more than one individual. In mineralized condition they agree with the remains of the type-specimen. The piece of frontal bone exhibits the characteristic texture and thickness, with only a very slight supraciliary ridge, and a small development of air-sinuses. The occipital bone is somewhat less thickened than that of the original specimen of *Eoanthropus*, and bears the impression of a less unsymmetrical brain. The external occipital protuberance is a little above the upper limit of the cerebellum, as in Neanderthal man; thus differing from the condition both in *Eoanthropus* and in modern man. The lower molar is exactly similar to the first lower molar of *Eoanthropus* already described, but it is more obliquely worn by mastication. Detailed comparison shows that this tooth is human, differing essentially from that of a chimpanzee in its more hypsodont crown, thicker enamel, and less prominence of the neck over the root. The occurrence of the same type of frontal bone with the same type of lower molar in two distinct localities, adds to the probability of their belonging to one and the same species. With these remains were found brown flints in great abundance, and one rolled portion of a lower molar tooth of *Rhinoceros* in the same highly-mineralized condition as the derived Pliocene teeth at Piltdown.

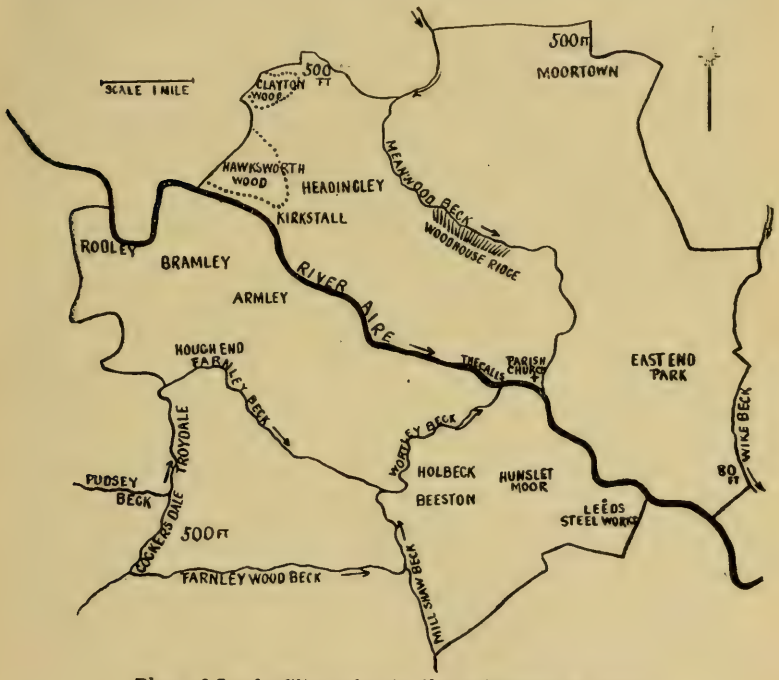
PARKA DECIPIENS.

This curious Old Red Sandstone fossil, made known to so many by Hugh Miller's 'Old Red Sandstone,' is the subject of an important paper by the late Lieut. A. W. R. Don, and Dr. G. Hickling, in the 'Quarterly Journal of the Geological Society,' part 4 of Vol. LXXI. for 1915, published January 13th, 1917. The fossil was early recognised as 'puddock spawn' by the Forfarshire quarrymen, a view supported by Mantell. Powrie suggested that *Parka* was the egg packet of Pterygotus—a view accepted by Lyell, Page, Murchison, Woodward, Huxley and a host of others, and this view for a long time was generally held. In 1890, Messrs. Reid and Graham were convinced of the vegetable nature of *Parka*, and the present authors do much to prove this. They consider that *Parka* is a complete plant, flat and thalloid, of variable form and size, and to have increased by marginal growth. It was a Thallophyte with Algal affinities.

THE MOSSES AND LIVERWORTS OF AN INDUSTRIAL CITY.*

W. H. BURRELL, F.L.S.

A STUDY of the distribution of Bryophytes within the Leeds City boundaries was prompted by a desire to fill a blank in the record books of the society, and to gain first-hand knowledge of the influence of smoke on this group of cryptogams. The area examined covers about thirty-four square miles, within



Plan of Leeds City prior to the extension of 1912.

the old city boundaries, excluding the recent extension at Shadwell, Roundhay, Seacroft and Crossgates. Altitude ranges from 500 ft. in the north and west to 80 ft. in the south-east where the river leaves the city. The most interesting ground for the moss student is the Millstone grit tract of the north and west, including Meanwood Beck, Clayton Wood and Hawkesworth Wood, retaining some of its natural vegetation of ling, bilberry, oak and birch, and the south-western

* Résume of Presidential Address to the Leeds Naturalists' Club and Scientific Association, December 11th, 1916.

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suburbs, including Troydale and Cockersdale, where there are exposures of coal measure, sandstones and shales, which weather to a clay soil carrying pasture and oak.

It has been shown* that the reduction of the intensity of sunlight, due to matter suspended in the atmosphere, amounted in the worst cases to 40 per cent. in the industrial districts of Leeds, growth being further prejudiced by mechanical obstruction of assimilation and respiration; by the toxic effect of sulphur compounds penetrating leaf tissues, and by the deleterious action on soil bacteria of free acids washed down by rain. Atmospheric impurities detected at different recording stations were influenced by the less complete combustion of domestic fires as compared with factory furnaces, and by prevalent winds, the cleanest districts being in the north-east, north and west. It is in these districts that the moss flora best maintains itself; as the industrial centre is approached, mosses decrease, until three only survive to rank with the sparrow as city dwellers. There is evidence that these three plants tolerate the worst atmospheric conditions, provided a favourable minimum of moisture is assured. Their absence from many miles of streets may be attributed to the combined effect of human disturbance, drought and chemical poisoning; in the midst of barren surroundings, they invade walls moistened by leaking pipes and steam exhausts, and they abound in damp, shady enclosures protected from excessive treading such as may be found at Holbeck Workhouse, East End Park, etc. The precincts of the Parish Church, the riverside near "The Calls," Hunslet Moor, and the immediate neighbourhood of the Leeds steel works probably represent the extreme of adverse atmospheric conditions for vegetation, but even there these mosses maintain an existence.

Some notes on their general distribution taken from standard authors† show that in addition to smoke resistence, they have an adaptability to extremes of temperature that gives them a claim to ubiquity.

Ceratodon purpureus.—The most cosmopolitan of all mosses; throughout almost the whole world from Spitzbergen and Greenland to the Antarctic regions.

Funaria hygrometrica.—Throughout almost the whole world on walls and rocks and especially on burned soil.

Bryum argenteum.—Almost everywhere throughout the world—Europe, America, India, Australia, Tasmania, to the extreme limit of terrestrial vegetation in 64° S.

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*The Nature, Distribution and Effects upon Vegetation of Atmospheric Impurities in and near an Industrial Town, by Charles Crowther, M.A., Ph.D. and Arthur G. Ruston, B.A., B.Sc. *Journ. Agr. Sci.*, IV., p. 24.

† Index Bryologicus, E. G. Paris; 'Handbook of the New Zealand Flora,' J. D. Hooker; Synopsis Muscorum, C. Mueller.

The absence of the two former from the region of his travels was considered worthy of note by that well-known Yorkshire bryologist, Richard Spruce. Writing to Sir Wm. Hooker, he said* : ' Since I set foot in South America, now more than four years ago, I have not once seen *Funaria hygrometrica*, the moss, which as someone has said, more poetically than truly, " Springs up wherever the wild Indian has lighted his fire." I have seen hundreds of places in Amazonian forests where Indians, wild and tame, have lighted fires, and the plants which spring up in such places are not mosses . . . . *Ceratodon purpureus* is an almost constant companion of *Funaria* in Europe and has, like it, the reputation of being cosmopolite, but I have never seen it here.' *Funaria* fruits in Hunslet, and is normal in habit. The other two react in special ways to very severe conditions. The typical silvery green julaceous branches springing from below the inflorescence of the Bryum are replaced by very short bud-like branches which arise all along the stem, having the appearance of green specks scattered over the dense blackish cushions ; they are easily detached and aid vegetative distribution. *Ceratodon* may occasionally be seen in an almost unrecognisable state in which groups of cells of otherwise dead leaf and stem tissues make a filamentous growth ; the dark green protoplasm abandons the old tissues and may produce a considerable amount of protonema from which moss plants have been seen developing.

When discussing some of the problems of their city distribution with Mr. C. A. Cheetham, he suggested that the Bryum is, in England, constantly associated with man, pointing out that whereas its two companions compete with the natural vegetation of heathlands, one never expects to see *Bryum argenteum* except on paths, roadsides, roofs, walls or disturbed soil. The habitats described by authors are not inconsistent with that suggestion, and it is a point worth determining to what extent in England it is dependent upon man.

The list of one hundred and seven species, comprising about ten per cent. of the British Bryophytes, represents the flora as it exists to-day, all but two having been seen recently. It has a negative as well as a positive interest ; one misses many of the large very common Feather Mosses (*Hypnum*) ; the Grimmias, Bristle Mosses (*Orthotrichum*), *Metzgeria* and *Frullania*. Species worthy of special notice, included, are Naked Apple-Moss (*Discelium nudum*), the Earth Mosses (*Ephemerum serratum* and *Acaulon muticum*), *Barbula lurida* and White-leaved Fork-Moss (*Leucobryum glaucum*). The last was believed to have disappeared from Adel Black Moor,

* Notes of a Botanist on the Amazon and Andes, Vol. I., p. 382.

just outside the city boundary, about 1870*, but is still lingering there as well as in the station now recorded.

Nomenclature is that of the Census Catalogues of British Mosses and Hepatics.

MOSSES.

Sphagnum fimbriatum. Meanwood ; Clayton Wood.
S. subnitens ,, ,,
S. intermedium ,, ,,
S. rufescens ,, ,,
S. squarrosum. Clayton Wood.
Tetraphis pellucida. Common on rock and dead wood.
Catharinea undulata. Common in woodland.
Polytrichum aloides. Meanwood.
P. gracile. Moor Town, 1877, *vide* Lee's Flora.
P. commune. Clayton Wood ; Farnley.
Pleuridium axillare. Farnley ; Bramley.
P. subulatum. Moor Town.
Ceratodon purpureus. Common throughout the city.
Dichodontium pellucidum. On wet rocks, Meanwood Beck.
Dicranella heteromalla. Common in the outskirts.
D. cerviculata. Near Headingley *vide* Carrington's flora ; Clayton Wood ; Woodhouse ridge.
D. varia. Woodhouse ridge ; Moor Town ; Farnley.
Dicranoweisia cirrata. On log. Meanwood.
Campylopus pyriformis. Woodhouse Lane Cemetery. Common on heathland.
C. flexuosus. Meanwood. Hawksworth Wood.
Dicranum scoparium. Meanwood.
Leucobryum glaucum. Hawksworth Wood.
Fissidens exilis. On a clay bank, Bramley.
F. viridulus. On rocks, Meanwood Beck.
F. bryoides. Common at Meanwood and Farnley.
F. taxifolius. Common on clay soil.
F. pusillus. On sandstone, Troydale.
Acaulon muticum. Meanwood. In Corn stubble, J. Abbot, 1871. Hough End. On fallow land, 1916.
Phascum cuspidatum. Hough End. Fallow land.
Pottia truncatula. Meanwood (W. West, Lee's Flora) ; Farnley.
P. intermedia. Roadside walls. Farnley, C.A.C.
Tortula muralis. Common in the outskirts of the city.
T. subulata. Farnley.
Barbula lurida. Farnley, C. A. Cheetham ; confirmed by W. E. Nicholson.
B. tophacea. Farnley ; Kirkstall.
B. fallax. Common in the outskirts.
B. rubella. Farnley.

* Lee's ' Flora of West Yorkshire,' p. 542.

Barbula cylindrica. Farnley.
B. vinealis. Farnley.
B. convoluta. Very common by roadsides.
B. unguiculata. Common on walls and banks.
Leptodontium flexifolium. On gritstone. Meanwood.
Weisia viridula. Farnley.
W. rupestris. On grit wall. Weetwood Lane.
Ephemerum serratum. Hough End. On fallow land.
Funaria hygrometrica. Common throughout the city.
Discelium nudum. Cockersdale, C.A.C., December, 1916.
Aulacomnium androgynum. Meanwood. On gritstone; Farnley.
Leptobryum pyriforme. Well distributed in small quantity on damp walls.
Webera nutans. Very common on heathland and in quarries.
W. proligera. Cockersdale; Moor Town.
W. annotina. Cockersdale.
W. carnea. Farnley.
W. albicans. Farnley.
Bryum cæspiticium. Common on walls in the outskirts.
B. capillare. Common on walls in the outskirts.
B. atropurpureum. Roadsides. Farnley.
B. argenteum. Common throughout the city.
Mnium punctatum. Wet places in the North and West.
M. cuspidatum. Farnley.
M. hornum. Common in woodland.
Fontinalis antipyretica. Meanwood Beck. On submerged rocks.
Brachythecium rutabulum. Common in the outskirts.
B. populeum. Meanwood and Farnley.
B. velutinum. Farnley; Armley.
B. plumosum. Meanwood.
Eurhynchium Swartzii. Farnley.
E. prælongum. Common in the outskirts.
E. pumilum. Farnley.
E. rusciforme. Common in wet places.
E. murale. Headingley; Farnley.
E. confertum. Common in the outskirts.
Plagiothecium elegans. Common in woodland.
P. denticulatum. Cockersdale; Troydale.
Amblystegium serpens. Farnley; Meanwood.
A. Juratzkanum. Cockersdale.
A. filicinum. Common in wet places.
Hypnum riparium. Meanwood Beck, on submerged rocks.
H. aduncum. Farnley.
H. cupressiforme. Sparingly distributed on walls, etc., in the outskirts. Good variety *ericetorum* occurs in Cockersdale.

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Hypnum palustre. Common on wet rocks.
H. cuspidatum. Meanwood; Troydale.
H. cordifolium. Farnley.
Hylocomium squarrosum. Cockersdale.

HEPATICS.

Riccia glauca. Fallow land, Hough End.
Conocephalum conicum. Very common on wet rocks.
Lunularia cruciata. Meanwood.
Marchantia polymorpha. Common in damp shady places.
Aneura pinguis. Canal bank, Rodley; Farnley.
A. multifida. Troydale; Farnley.
Pellia epiphylla. Very common in wet places.
Fossombronia pusilla. Moor Town; Bramley; Farnley; Cockersdale.
Alicularia scalaris. Troydale.
Gymnocolea inflata. Meanwood.
Lophozia attenuata. On gritstone. Meanwood.
L. ventricosa. Meanwood.
Lophocolea bidentata. Common in woodland.
L. heterophylla. Common in woodland.
Chiloscyphus polyanthus. Troydale; Cockersdale; Farnley.
Cephalozia bicuspidata. Common in the outskirts.
C. Lammersiana. Cockersdale.
Cephaloziella byssacea. On gritstone. Hawksworth Wood.
Calypogeia Trichomanis. Very common in the outskirts.
C. fissa. Ridge of Woodhouse Moor (*Naturalist*, 1911, p. 61).
Lepidozia reptans. Common on gritstone in the north and west.
Diplophyllum albicans. Meanwood.
Scapania undulata. Meanwood.

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Bird Notes from the Huddersfield District.—The recent severe weather brought some unusual bird visitors to the Huddersfield district. Some passed on, their identity only guessed at, but others have fallen to local gunners, and can be authenticated, having been preserved and stuffed by Mr. Alfred Kaye of Lindley. Among those I have seen are a common Scoter duck and a black-throated diver from Thorpes Reservoir, Slaithwaite. The former is an occasional winter straggler into the district, and the latter is recorded for Huddersfield in the 'Birds of Yorkshire' on the authority of Eddison, but this is regarded as a doubtful record in Mosley's 'Birds of Huddersfield.' In February, some young common gulls (*Larus canus*) were shot near Elland, and towards the end of last year, a little grebe (*Podiceps fluviatilis*), an almost extinct native of the district, while resting on the ground some distance from water, was seized by a dog at Mapplin Lees, Marsh.—WM. FALCONER, Slaithwaite, February 27th, 1917.

CLEVELAND HYMENOPTERA.

J. W. HESLOP HARRISON, M.Sc.

In this series of notes it is proposed to put on record various captures made during the past few years in the more northern portions of the Cleveland District. Most of the species recorded below have been taken casually whilst working other groups, and have been worked out subsequently. As the record, in some groups, of such casual captures have reached appalling dimensions, I have finally been forced to prepare the present papers, which are not to be considered to exhaust even the material already worked out.

* *Vespa vulgaris* Linn. Common everywhere in the neighbourhood.

V. germanica Fab. Although, in many places, even in Yorkshire, as in the Malton and Castle Howard district, this occurs just as plentifully as *V. vulgaris*, I have only taken it once here, and that at Newby.

* *V. rufa* Linn. Also fairly general, but not nearly as plentiful as *V. vulgaris*.

V. austriaca Panz. This is probably the most important record I have to make. I take the hibernated queens every year, towards the end of June, in Lonsdale, in some quantity. This is long after the queens of all the other species are past their prime. These queens are taken as they flit in and out of the bases of the bilberries and the like. It is an extremely important point that *V. austriaca* is commoner in Lonsdale than *V. rufa*, on which it is supposed to be solely inquiline. Moreover, I have actually taken a queen investigating a small nest of *V. sylvestris* suspended from a low pine branch amongst heather.

* *V. sylvestris* Scop. About as common as *V. rufa*, although a little commoner on the higher ground. Have seen a nest in a back-yard in the heart of Middlesbrough.

V. norvegica Fab. With the latter species, but less common.

Bombus smithianus White. Pretty common on all the moors. Although it appears to be common enough in the low-lying districts of North Durham, I have never seen it lower than Eston Moor here.

**B. agrorum* Fab. Abundant everywhere and varying tremendously in depth of colour.

**B. hortorum* Linn. As with *B. agrorum*.

B. latreillellus var. *distinguendus* Mor. I take this sparingly on Eston Moor ; the type does not occur.

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* Indicates a species captured in Middlesbrough itself.

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**Bombus lapidarius* Linn. Not as common as one might expect, but still far from rare. Occurs generally.

B. sylvarum Linn. Very sparingly, Great Ayton.

B. derhamellus Kirby. Sparingly, but general in its occurrence.

**B. pratorum* Linn. Common everywhere.

B. lapponicus Fab. Rare on Eston Moor, but quite common on Great Ayton and Easby Moors, as well as in the open spaces in Kildale Woods. This is probably our earliest bee, as I see the workers in some numbers at bilberry flowers. Anyone wanting an exercise in quickness of hand should endeavour to net the little worker from the flowers. Their quickness in turning in and vanishing from the net can only be described as phenomenal.

**B. terrestris* Linn. Very common ; the var. *lucorum* seems to predominate in the lowlands, and the var. *virginalis* on the moors, the latter assuming an enormous size. Type forms, as well as the two varieties, occur everywhere.

Psithyrus vestalis Fourc. Common everywhere.

P. barbutellus Kirby. General, but not so common as the last species.

P. campestris Panz. Not very common, but to be found everywhere. I have taken the black form on Eston Moor.

P. quadricolor Lep. Only sparingly ; certainly not so common as its association with *B. pratorum* would suggest.

Andrena cineraria Linn. Very common, but exceedingly capricious in its appearance at bilberry in Lonsdale.

A. minutula Kirby. Also common on bilberry on Eston Moor and in Lonsdale.

A. clarkella Kirby. Common enough on Eston Moor.

A. wilkella Kirby. Also abundant on Eston Moor.

**Sirex gigas* Linn. Whilst I often get specimens of this sawfly taken in Middlesbrough brought to me for identification, I have also beaten it in some numbers from larch and fir at Eston. I have also, on two occasions, found moribund females with their saws fixed in larch trunks, as if they had been unable to withdraw them.

**S. noctilio* Fab. Precisely the same remarks apply to this as to *S. gigas*, except that it occurs less freely. It, too, has been taken at Eston with its saws fixed in a larch trunk.

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The Irish Naturalist double number for November and December, is entirely occupied by an author's index of the *Irish Naturalist* from Vol. 1 to 25, by Alice Scharff. The readers of the journal will find the index very useful.

In *The Entomologist* for March, Mr. Mainbridge describes a new variety *plumbosa* of *Aplecta nebulosa* (see *The Naturalist*, March, p. 94) ; Mr. L. W. Newman gives ' Notes on rearing Macrothylacia (Bombyx) rubi,' and Mr. Claude Morley continues his ' Garden Notes.'

OBSERVATIONS ON RANUNCULUS FICARIA.

MARY A. JOHNSTONE, B.Sc., F.L.S.

(*Continued from page 105*).

(*b*) This was in the same narrow valley as (*a*), but on the opposite bank of the stream. The canopy of small birch trees was broken by many gaps ; the ground was lightly shaded in summer and perfectly open in winter and spring ; the aspect was South. The dominant amongst the ground vegetation was *R. Ficaria*, which formed an almost uniform carpet. I examined an area of several hundred yards and was struck by the seemingly erratic variations in distribution. Some of the patches—several yards in extent—presented the appearance of close green mats of leaves, with just here and there as in (*a*) solitary, tall, flowering exceptions. The modest leaf display was the covering for an interesting underworld. Spreading slightly outwards, the upper leaves touched and overtouched one another till they constituted a green roof for quiet little houses beneath them. Their still, dark, sheltered chambers had tempted out from the leaf-bases crowds of little tubers. The moist, equable air conditions suited them admirably, and a delicately pretty appearance was given by the fine clothing of root-hairs, softening the clean white surface.

Quite close alongside these green stretches, were others shining as sheets of blossom. Scarcely a tuber was to be found there. I could find no difference in age, soil, drainage, lighting, protection or other factor which could account for the abrupt changes which succeeded each other all over that piece of ground.

(*c*) The ground was drier in the area here described. Celandines had colonized parts here and there alongside a pathway through a plantation of young spruce and larch. No obvious law decided the prevalence of one or other of the types of Celandine. In one spot, exposed to full sunshine, the plants were small, had numerous aerial tubers and showed flowers at the rate of about a dozen to five square yards. Elsewhere, they grew through a layer of pine needles ; light was medium, shelter was good ; growth was vigorous, flowers were not many and tubers were absent. Again, on a rather more open space, tall, well-branched plants were growing amongst moss. Some of these produced aerial tubers and about an equal number produced flowers.

(*d*) This location lay along the side of a moorland road bordered by a few feet of grass edge, a shallow ditch, and the remains of a hawthorn hedge. The cutting of the hedge looked as if it might have been done within the last few years ; the hedge had probably been so tall as that still left on the

opposite side of the road—about nine feet. When I saw this place at the end of April, it presented a perfectly gorgeous display of Celandine bloom ; the flowers in their thousands were thrown wide open to the strong sunshine. A few yards further on, I came upon another expanse, surprisingly different. Here, in precisely similar relationship to hedge and ditch, there was scarcely a single flower. General growth was luxuriant and tubers were borne plentifully. The two strips, throughout their whole length and breadth, benefitted equally from the full day's sunshine. They were equally moist and they gave equal facilities to insect visitors. I could find no differing factor in the two environments, and I could find no indication that the beds were of different ages. There was no means of finding out if the two parts of the hedge had been cut in different years. On going back to the brilliant bed, I found on closer examination that it was by no means uniform. In some groups of plants, blossoms were thrown up most profusely, but no tubers. Side by side with these other smaller and more readily overlooked clumps mustered few flowers but many tubers. A third variety consisted of normal flower-bearing specimens, with the unusual accompaniment of a number of aerial tubers.

It was a possibility that the second strip mentioned had not been free from the shade of the hedge for as long a period as the first, and that its vegetation had not had time to accommodate itself to the new condition ; on the same supposition, some of the examples in the flowering area might have been in a transition stage. It might be noted, however, that the few plants growing under the tall hedges near by were very free-flowering.

(*e*) At the bottom of a deep, wet ditch, on dark sodden leaf-mould, there grew only a few rather rank-conditioned Celandines. No flowers were present ; the leaves were remarkably crinkled and there was a goodly crop of tubers. Eighteen months ago, several of these were transplanted into good garden soil and into a situation where they were fully exposed to light. Last summer, they came up in a miserable fashion, the whole extent above the ground being no more than an inch and a half. They bore no flowers : the leaves were very small, but they were still crinkled ; aerial tubers persisted, now quite close to the soil.

(*f*) Throughout a small area amongst the grass surrounding the stump of a tree on a lawn, small, compact specimens of *R. Ficaria* were to be found. They resembled the plants of the grassland association except that they possessed a system of tubers arising in their leaves. Presumably, they had existed as free-growing forms beneath the shade of the tree and the tubers were relics of that time, which they had retained.

Nothing quite conclusive emerges from the consideration and comparison of the typical habitats instanced above, but the following points may usefully be summarised :—

1. Flowering forms are not the commonest in shade habitats.
2. The tuber-bearing form is common in such places.
3. The tuber-bearing form is not limited to the shade ; it often exists intermingled with, or close by the other in even the most brilliantly lit spaces.
4. The closed community of the grassland never harbours the tuber-bearer.
5. The plant seems to retain its tuber-bearing characteristic even when it changes many others, on being subjected to change of surroundings.

The illumination factor does not seem to afford a solution for all cases of the problem. It remains to be proved by further observation and by experiments in tuber and seed propagation whether or not the differences between the two types of plant are inherited and are indicative of species or variety.

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Economic Geology. By **H. Ries** (4th ed.). London : Chapman & Hall, xviii+856 pp., 17s. net. There is little wonder that this excellent work, with its 300 maps, sections, diagrams and photographs, and very good index, has reached its fourth edition in eleven years. The author is Professor of Geology at the Cornell University, and he naturally illustrates the various sections of his work by American examples. Certainly that continent is able to provide ample illustrations of the various ways in which geological science can be employed economically. The first section of the book is devoted to ' Nonmetallics,' and refers to Coal, Petroleum, Building Stones, Clay, Lime, Salt, Gypsum, Fertilizers, Asbestos, Graphite, Sand, Precious Stones, Underground Waters, etc. The second portion refers to the various metallic ores, their occurrence, working, etc. Each subject is dealt with exhaustively, and is amply illustrated by numerous blocks. Though British products are not dealt with, British geologists will find much of value in the volume.

The Origin of the Earth, by **T. C. Chamberlain,** Chicago. University Press, 271 pp. 6s. net (published in the United Kingdom by the Cambridge University Press). In this book (the weight of which we are told is 1lb. 6 oz.), the author carefully reviews the various theories as to the origin of our planet. He refers to Laplace's beautiful theory of the origin of the solar system, that the earth was at first all gas, then became a white hot mass of lava, and gradually cooled to the earth as we know it. ' But the theory of a simple decline from a fiery origin to a frigid end, from a thick blanket of warm air to a thin sheet of cold nitrogen, consonant with the current cosmogony as it was, logical under the premises postulated, pessimistically attractive in its gruesome forecast, already in possession of the stage, with a good prospect of holding it—this theory of a stupendous descensus none the less encountered some ugly facts as enquiry went on. In seemed to accord well enough with an ice-age, if the ice age came *only* in the later stages of the earth's history, but it was ill suited to explain an ice age in the earlier geologic eras.' The author has much to say on ' the juvenile shaping of the earth,' due to gravitation and rotation, and he gives some remarkable diagrams in support of his views. He concludes that, in his opinion, what we conveniently regard as merely material, is at the same time spiritual, that what we try to reduce to the mechanistic, is at the same time volitional.

YORKSHIRE MYCOLOGISTS AT BUCKDEN.

A. E. PECK.

(*Continued from page 102*).

The evening Lectures, held in the Village School-room, were well attended by local residents.

Mr. Cheesman gave a well considered address upon the subject of the Tremellineæ.

'The Tremellinaceæ,' he said, 'may be considered to be the lowest and primitive group of the Hymenomycetes. They are of a jelly-like consistency, hard and horny when dry and reviving when moistened.

The basidia which are immersed in the gelatinous matrix, are very variable in form and unlike those of any other group, being transversely or longtitudinally septate, indicating a connecting link between the Ustilagineæ and the Uredineæ on the one hand and the true Basidiomycetes on the other.

The spores of some species, instead of germinating at once into mycelium, produce secondary spores or sporidiola. A review was made of the three sub-families and the fourteen genera of the group, the leading features of interest pointed out and illustrated by means of diagrams and specimens.'

Mr. Peck gave his Lantern Lecture entitled 'In the Track of the Gamekeeper,' dealing with the work and surroundings of the interesting individual named, coupled with natural history references and the relation of a few anecdotes and personal adventures.

Dr. Wager gave a lecture on 'Toadstools and their Ways,' illustrated by specimens and drawings on the blackboard. In his introductory remarks, he mentioned that this was the third time the Mycological Committee had met under the shadow of the great war. The desirability of continuing to hold these meetings had been under consideration, but it was felt that the study of Fungi is so important, both from an economic and a scientific point of view, that it would be unwise to discontinue them altogether. Many problems of general scientific interest in Biology have been elucidated by the study of the structure and physiology of the Fungi, and, in its more utilitarian aspects, a knowledge of the life histories of Fungi is of paramount importance in our attempt to deal with the enormous annual losses due to the fungus pests which attack our field and garden crops. The utilisation of Fungi as food is also an important matter. For want of an elementary knowledge on the part of the people, both rich and poor, of what are called toadstools, large quantities of most excellent

food are wasted annually which, at the present time especially, would be of the greatest assistance in economising our food supply.

All the larger Fungi except mushrooms, are commonly known as toadstools from some supposed association with toads. Thus, Spencer, in the Shepheard's Calender (December) says :—

" Where I was wont to seeke the honey Bee,
Working her formall rowmes in wexen frame,
The grieslie Tode-stoole growne there mought I see,
And loathed paddocks lording on the same : "

In discussing the structure and life history of typical toadstools, Dr. Wager referred to the enormous number of spores produced. In an ordinary mushroom for example, Buller has calculated that in a specimen with a pileus 8 cm. in diameter, there are approximately 1,800,000,000 spores. In a large specimen of the giant puffball, Buller estimated there were produced about 7,000,000,000,000 spores, or as many as would be liberated by about 4,000 good sized mushrooms.

Among other topics dealt with in the lecture, were the development of the fruit body, reproduction, the distribution of spores, spore colouration and classification.

Altogether, 350 species were recorded, which included 39 Mycetozoa and 47 Lichens, the following being the more noteworthy :—

First British Records.

Lepiota lilacea Bres.
Tricholoma unguentatum Fr.
Hygrophorus obscuratus Karst.
Nolanea vinacea Fr.
Entoloma dichroum Pers.
Hebeloma diffractum Fr.
Hypholoma irroratum Karst.
Odontia farinacea Pers. (Quél.).
Tomentella fusca Pers.

New to Yorkshire.

Lepiota holosericea Fr.
Entoloma ardosiacum Bull.
Cortinarius (Phleg.) *claricolor* Fr.
Cortinarius (Derm.) *cotoneus* Fr.
Polystictus gossypinus Lév.

First Records for Mid-West Yorkshire.

Lycoperdon echinatum Pers.
Armillaria ramentacea Bull.
Tricholoma onychinum Fr.
T. immundum Berk.
T. sulphureum Bull.
T. albellum Fr.
Clitocybe ditopoda Fr.
Mycena rugosa Fr.
M. ammoniaca Fr.
M. haematopoda Fr.
Omphalia sphagnicola Berk.
Entoloma lividum Bull.
E. porphyropheum Fr.
Entoloma rhodopolium Fr.
Leptonia solstitialis Fr.
Pholiota aurea Pers.
P. togularis Bull.
P. aegerita Fr.
P. adiposa Fr.
P. flammans Fr.
Inocybe Godeyi Gillet.
I. sindonia Fr.
Hebeloma glutinosum Lindg.
H. sinapizans Fr.
H. longicaudum Pers.
H. ischnostylum Cke.

Tubaria paludosa Fr.
Cortinarius (Phleg.) *glaucopus* Schaff.
,, ,, *fulgens* A. & S.
Cortinarius (Ino.) *albo-violaceus* Pers.
,, (Derm.) *tabularis* Bull.
,, ,, *caninus* Fr.
,, (Tel.) *rigidus* Scop.
,, (Hydr.) *leucopus* Bull.
Psathyra bifrons B. & Br.
Coprinus tardus Karst.
Paxillus lepista Fr.
Hygrophorus fusco-albus Lasch.
Lactarius insulsus Fr.
L. umbrinus Pers.
L. minimus W.G.S.
Russula chloroides Bres.
Russula furcata Pers.
R. sardonia Fr.
R. lactea Pers.
R. armeniaca Cke.
Boletus crassus Massee.
Polyporus fragilis.
Fomes connatus Fr.
Poria terrestris Fr.
Sphaerotheca pannosa Wallr.
Dichaena quercina Pers.
Helvella ephippium Lév.
Geoglossum hirsutum Pers.
Peziza (*Galactinia*) *succosa* Berk.
Otidea leporina Batsch.
Cyathicula coronata De N.
Irpex obliquus Fr.
Stereum rugosum Fr.

NEW HOST RECORD.

Pilobolus crystallinus Tode (on deer's dung).

It was decided to meet next year at Helmsley.

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YORKSHIRE NATURALISTS' UNION: VERTEBRATE SECTION.

MEETINGS of the Vertebrate Section of the Yorkshire Naturalists' Union were held in the Philosophical Hall, Leeds, on February 17th. Mr. H. B. Booth presided over the business of the Birds and Eggs Protection Acts Committee, to which Messrs. Johnson Wilkinson, M.B.O.U., Huddersfield, and F. H. Edmondson, Keighley, were elected joint secretaries. Last year's methods having proved satisfactory, it was agreed that bird protection in the county this year continue on similar lines, and representations be made to the military authorities to suspend 'bombing' practice at Hornsea Mere from mid-April to mid-June.

In proposing that Lord Devonport, the Food Controller, be requested to make use of the eggs of the Black-headed, Common, Herring, Greater and Lesser Black-backed Gulls, Guillemot and Razorbill, in large and easily accessible colonies, in 1917, Mr. H. B. Booth remarked that the society for many years had helped the gulls, and it was felt that in this year of threatened food shortage, the gulls could materially help us, without imperilling the number of any, all having increased out of proportion to the available food supply in late years. The watchers at the gulleries, with a little assistance, could regularly collect the eggs for despatch to the large towns, where they could be retailed much cheaper than those of the barnyard fowl. Mr. Booth estimated that in this way millions of additional eggs, equal to hundreds of tons in weight, could be brought into the market. He also

pointed out that such eggs are regularly taken for food in Continental countries, particularly Holland, and that Black-headed Gulls' eggs, when mistakenly eaten for Plovers' eggs in England, were counted great delicacies. The proposition was unanimously accepted, and the members present offered to place their services at the disposal of Lord Devonport should he require suggestions or advice as to the best method of collecting and distributing the eggs.

Prof. Garstang, M.A., D.Sc., presided at the ordinary meeting of the Section, at which Messrs. W. Denison Roebuck, M.Sc., and J. F. Musham, the chairman and convener respectively, reported that the Mammals, Amphibians, Reptiles and Fishes Committee had been revived at the annual meeting of the Union, at Selby.

At their invitation many specimens of the smaller mammals were exhibited. These included a variety of the Water Shrew, formerly known as the 'Eared Shrew,' dug from the garden of Mr. J. W. Taylor, M.Sc., Horsforth, in November. Except for a small artificial pond in the garden, the nearest water is some distance away. Mr. Booth brought a melanic water vole sent by Mr. T. Roose, who obtained it from a swamp at Hazlewood, near Bolton Abbey. For 70 or 80 years a colony of voles of this variety has been known to exist there, and wrongly supposed by many to be Old English Black Rats. Unfortunately for the animals, the swamp has recently been drained.

Many accounts of the sufferings of birds during the protracted frost were given; in various parts of the county grouse have been driven from the moors to the valleys.

With a nestling Hoatzin (South America) as a model, Prof. Garstang offered some notes on Nestlings and on the peculiarities of nestling plumage. The Hoatzin nests in the trees over swamp and water. The nestlings have sparse, downy tracts, and as soon as they are hatched they leave the nest, and by beak, claws and nails on the wing, climb about the trees. Anatomists had suggested this as evidence that birds had evolved from lower animals, and that the very earliest forms built their nests in trees. Prof. Garstang, who believed the earliest forms were ground nesters, exhibited down from various nestlings, and traced the evolution of a feather from the scale of a Lizard, through the extinct Archæopteryx and other early birds, to the down of a modern nestling. Those of the most ancient and lowest forms, such as the struthious birds, the Tinamons and a genus of Sand Grouse, were longitudinally striped. In modern ducklings there is noticeable a distinct shaft with many horizontal or crossed filaments; domestic fowl chicks and young game-birds have this shaft less discernible, and the horizontal filaments are fewer; but in young terns the shaft and horizontal

filaments have entirely disappeared, the down consisting simply of a small quill which has independent radiating filaments. Comparing the eggs of a Snipe and a Thrush, and a Lapwing and a Jackdaw, birds about the same size, Prof. Garstang showed that the egg which produces a downy chick is larger and longer in incubating, than the egg of a passerine or more highly developed species.

Mr. Booth, introducing a discussion on the varying number of eggs laid by different species, contended that whilst the Columbidæ (Doves) and Charadriidæ (waders, etc.) are constant in their egg laying habits, the majority of British species show considerable diversity. One explanation was that they are endeavouring to increase their numbers or at least keep up to the level of the past. Yet some species are decreasing whilst others are increasing, and the singular thing is that the Blue Tit, which lays a large number of eggs, probably is not increasing as much as the Guillemot, Gannet and Fulmar, though they lay only a single egg. The speaker's former opinion was that the smallness of a clutch was associated with longevity, but in the case of the notoriously long lived species comprising the Anatidæ (Swans, Geese, Ducks), this does not apply. Neither does the relative abundance or variety of the food supply throw any light on the matter. It is even doubtful whether, in years of super-abundance of a suitable food, certain species do increase the number of their eggs, as is attributed to the Short-eared Owl in Scotland during a vole plague. Trustworthy oological friends entitled to speak with authority, assured him that neither the Rough-legged Buzzard nor Arctic Skua increase their clutches when Lemmings, on which both very largely feed, are plentiful in Scandinavia. In fact, over-feeding in domestic varieties tends to decrease productiveness, and this also appears to be true in the human race.

The discussion was continued, but nothing definite could be arrived at.

Mr. Ralph Chislett showed a fine series of lantern slides of the Nightjar, eggs, parent birds, and the young in stages up to 15 days. Mr. Jasper Atkinson had also a fine selection of slides of his last year's work, which included series of the Redstart, Snipe, Blue Tit and Sand Martin.—W. Greaves.

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Hull Museum Publications, No. 110 (being the Quarterly Record of Additions No. 55), is largely composed of papers which originally appeared in *The Naturalist*. It contains Mr. T. Sheppard's paper 'On Arranging Museum Cases for Birds'; papers on Mollusca by Mr. Hans Schlesch; The Distribution of Spiders in East Yorkshire, and The Bristly Millepede in East Yorkshire; by Mr. T. Stainforth, and *Pseudanodonta elongata* in Yorkshire by J. A. Hargreaves and J. Digby Firth. The publication is sold at one penny.

THE SHELLS OF THE HOLDERNESS BASEMENT CLAYS.

ALFRED BELL.

(*Continued from page 59*).

Astarte banksii Leach is often used instead of *A. compressa* Mont. The latter name is so well known that for present purposes it is not worth changing, and has so many varieties of which the *A. warhami* may be an extreme form. *A. banksii* is here used for the elongate type and *A. compressa* for the more circular varieties.

A. compressa latior is probably one of Bean's M.S. names. It is quoted in Forbes Memoir (Geol. Surv., Vol. I., 1846, p. 414) as var. *B.* (*latior*) now essentially northern, and by Prof. King, Ann. Nat. Hist. XVIII., as a Bridlington Shell. A specimen in the York Museum is nearly one inch broad.

A. compressa nana, a small shell in the York Museum, labelled *A. indefinita* in Bean's well-known writing seems to be the *A. compressa* var. *nana* Jeff., B.C. ii., p. 316.

A. richardsoni, figured in Belcher's Last of the Arctic Voyages, pl. 33, fig. 7 (1855), is a well-grown shell, L. 30 mm. B. 38 mm. It is rare in Bridlington.

A. placenta Mörch is well figured by Jensen, Danish Ingolf. Expedition, 1912, pl. IV., f. *c d*, and by Leche, Svenska, Exped. till Novaja Semlja in 1878, pl. I., fig. 4.

A fine shell in the York Coll., labelled *A. fluctuosa* in Bean's writing appears to be a very elongated form of *A. semisulcata*, H. ·24 mm., B. 45 mm., apex nearly central. It seems to be an extreme example of the var. *sericea* Posselt. (Med. om. Grœn., XIX., pl. I., fig. 8-12, and by Jensen op. cit., pl. IX., fig. 1 *f*. The above three shells appear to belong to the *semisulcata* group, frequently known as *A. borealis*.

A. elliptica (*crassa* Leche) Brown. The Bridlington shell I refer to this is figured by Jensen, op. cit., pl. IV., fig. 4*e*, as *A. elliptica* var. *crassa* Leche, pl. I., fig. 3 *ab*. It has little reference to the shell we consider as the type.

The *A. lactea* of Brod. and Sow., figured by Dautzenberg and Fischer in the Monaco Scientific Expedition (Mollusques), pl. XI., figs. 26 to 28, seems to be the same as that figured by Wood, Crag Mollusca, pt. 2, pl. XVI., fig. 3, as *A. withami*.

Note D.—*Acila*—The shells of this ornamental group of Nuculas abound in the Bridlington series, frequently in pairs, but more often in various sized fragments. Small valves from barely 3 mm. in diam. upwards are present.

The name shell *A. cobboldiæ* J. Sowerby, is very variable in the later pliocene series, ranging from a nearly circular to the angular types figured by Mr. Wood—or probably there

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are more than one species so called. This seems to be so at Bridlington where the *N. insignis* Gould is common. It also occurs in the Chillesford beds. Wood's figure seems to differ in shape (not sculpture) from Sowerby's type, as it also does from the fully adult *A. lyalli.*

Woodward remarks that the Bridlington shells differ from those of the Crag in a tendency to become smooth when approaching full growth. Such is the case with the few fragments of this shell I obtained from the Wexford gravels.

Note E.—*Ostrea celtica**—Oysters are rare in the Bridlington group. The best I have seen is the one in the York Museum, H. 60 mm., B. 45 mm. It is not well preserved, but appears to be of the same type that occurs at Bohuslan and in the Shetlands, where it is nearly extinct—as it is in most localities in the north where formerly abundant, *i.e.* W. Scotland. It is not the *O. edulis* of Linné, the type of which in the Linnean Society's possession is the O. *cristata* of southern authors, and ranges in a living state from Bohuslan to the Mediterranean, *via* the West Coast of Ireland. Pending a memoir on the British Oysters, I have named the northern form *A. celtica* to distinguish it from the Linnean shell. Jeffreys seems to have been misled in giving Iceland as a locality, as his authority, Mohr., 1786, is only quoting from an earlier work by Olafsen, 1772, who, in his turn remarks, 'but we have not seen it.' (Jensen op. cit.). So far as I can see, after a careful examination, this type of oyster has only a cousinly relation to its pliocene predecessor.

The shells vary very much as regards preservation. In the body of the clay they are, or were, often preserved in places. In others, while the contour of the shell is unaltered, the shell itself has been separated into many fragments, much as if the shell had been broken in situ, and the edges of the fragments contracted after breakage. This disjunction seems to be the cause of so many loose pieces remaining after washing. Mr. Headley, writing to me, says 'The shells in the clay seemed broken in place and the edges were sharp.' In the sand 'the edges were worn and broken.'

The clay is very homogenous and is regarded by Mr. Lamplugh as a true glacial mud. Its origin I suggest to be due in large measure to muddy streams or to 'large volumes of water issuing from the edges of the ice upon the escarpment,' (Lamplugh), some miles to the N. East. R. Brown, Physics of Arctic Ice, Q.J.G.S., 1870, p. 671, noted from

* Mr. Reid records a bed of double Oysters from above the Weybourne Crag, near Lower Sheringham, N. of Weybourne, and apparently on a level with the *Leda myalis* bed.

experience in Greenland that such streams deposited a muddy sediment, averaging 3 inches yearly upon the sea bottom into which it flowed and incorporating in its body the shells and stones already present on its floor.

The shells in the streaks and pockets of sand imbedded at different levels in the body of the clay, appear to have a different origin although of the same geological age, and as I suggest came into our area from a distant region near to, or within the Arctic circle, brought by floating ice in some form, lifted from the sandy bottom or sea shore by anchor ice, and transported in bulk as frozen masses, or boulders to the Yorkshire coast. Once deposited, the frozen sand would lose cohesion and easily acted upon and distributed. As Mr. Lamplugh says, 'Somewhere there must have been a period when the sea was crowded with icebergs and floe ice flowing hither and thither at the mercy of wind and waves, and there is no reason why portions of a sea bottom may not be caught up and carried by detached bergs till stranded on opposite and far distant shores.'

It is to some such agency rather than to the passage of ice traversing the sea bottom that I think we must look to account for the arctic shells in such abundance. It is significant that no similar assemblage of species occurs living south of the arctic circle, as at present recorded unless at extreme depths.

The undoubted presence of Bear, and the traces of a freshwater plant bed, with *Limnaea peregra* in the basement clay below the purple clay, lends support to the suggested proximity of land; and this view seems to harmonize with Mr. Lamplugh's opinion 'that the Basement Clay cannot be marine, and can scarcely be other than the product of land ice,' and yet allow for the presence of marine shells in the clay.

Concerning the place in time of the Bridlington group, Mr. Lamplugh suggests that the old Sea-beach series at Sewerby, below the basement clay is coequal with the *Leda myalis* bed of the Cromer Cliff, Norfolk. I would go farther, and make the Sewerby shore and the Weybourne Crag march together and place the overlying *myalis* bed at Runton Gap, the Chillesford sand and clay seen at Chillesford Church pit, Suffolk, and the Bridlington beds on the same horizon, as I agree with Prof. Prestwich, Geology, Vol. II., p. 447, 1888 'that' the Bridlington Clay may represent or be equivalent to the more arctic portion of the Chillesford Clay.

The Chillesford shells in the accompanying list, were collected by Dr. Boswell and myself during 1913, and the *myalis* species are taken from Mr. Reid. Plioc. Dep. Great Britain (Mem. Geol. Survey), p. 193. Except *Lucina borealis* all these occur at Bridlington, and like the shells there are frequently found double and in their natural life-positions.

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If this view is sustained, there is no reason to consider the other members of the Bridlington beds as derived. Those I have seen are perfectly fresh and unworn,—a polyzoan (*Flustra*) and an *Echinus* (*norvegicus* ?) may be added to the list.

	Chillesford Church, C.		Myalis (Cromerian) bed M.		
	C	M		C	M
Amauropsis islandica ..		×	*Mya arenaria*		×
Buccinum undatum ..	×	×	*M. truncata*	×	×
Littorina littorea ..		×	*Mytilus edulis*	×	×
L. rudis	×	×	*Acila cobboldiæ* ..	×	
Natica affinis	×	×	*Nucula tenuis*	×	
Neptunea antiqua ..		×	*Yoldia lanceolata* ..	×	
N. contraria		×	*Y. myalis*		×
Purpura lapillus ..		×	*Y. oblongoides*	×	
Turritella terebra ..	×		*Ostrea edulis !* sp. ..		×
Astarte borealis		×	*Panopea norvegica* ..	×	
Cardium edule		×	*Pecten opercularis* ..	×	
C. grœnlandicum ..	×		*Tellina balthica*		×
Cyprina islandica ..	×	×	*T. obliqua*	×	×
Lucina borealis	×		*T. praetenuis*	×	
Mactra elliptica	×		*Syndosmya alba*	×	

The absence of *Tell. balthica* from the above list is the principal item against the Chillesford Clay being synchronized with the Bridlington *Leda myalis* beds, seeing it is so abundant in the Weybourne and Bure Valley deposits. It may have been passed over as a young *Tell. obliqua* as I certainly received it amongst a parcel of the latter from Aldeby, recognised as *T. balthica* by Messrs. Wood, Jeffreys and other conchologists, who rejected it on the ground that being an only specimen, it must have got in to the parcel by accident, a view I objected to at the time as I do now, because in texture, colour and condition, it was not different from the others and unlike those from any of the Weybourne group of deposits.

I have to thank the Custodians of the Bridlington treasures for the kindly and ready facilities afforded me in the work, and the 'Percy Sladen Memorial Fund' for assistance in meeting expenses incurred in search of material.

Addendum.

Since the above was written, I have received from Mr. Kennard, F.G.S., a quantity of material obtained by him from the *Leda myalis* bed, including *Scalaria grœnlandica*, *Bela* (several species), *Nucula cobboldiæ*, *Yoldia hyperborea* or *oblongoides*, and others, all of forms occurring in the Bridlington list, numbering up to 40 species. (The *Yoldia truncata* bracketed in the last line of that list should read *Y. hyperborea* Lov.).

Dr. C. T. Trechmann has recently described (*Quart. Journ. Geol. Soc.*) some remnants of early clays on the Durham coast containing arctic shells and Norwegian rocks of the usual types, apparently of the same age as the Holderness basement clays.

In Memoriam.

GEORGE MASSEE, F.L.S., V.M.H.
(1850—1917).

THE thinning ranks of Yorkshire naturalists are still receiving losses of exceptional severity. In recent months our pages have recorded the decease of many prominent workers. To the list must now be added the name of George Massee, through

Photo by] [*Miss Ivy Massee.*

George Massee.

whose enthusiasm and hard work the Yorkshire Mycological Committee came to be, carried out its several years of useful work, and published the first county Fungus Flora ever prepared. Each year, for years, he regularly gave much of his valuable time in investigating the mycological flora of the areas worked by this committee ; they were no ' pleasure trips ' to him, and his assiduous labours in collecting and identifying specimens, in assisting other workers, and in giving popular lectures, will long be remembered by those who had the privilege to benefit thereby.

1917 April 1.

He was a prolific writer, being the author of over 250 books and papers. He worked with rapidity, and had a very good memory. One of his first papers, on woodpeckers, written when he was seventeen years of age, was published in *The Intellectual Observer*.

An excellent account of Mr. Massee, in the 'Notable Personalities' series, appears in *The Agricultural Economist* for July, 1913, from which we take the liberty of quoting the following:—

'Born at Scampston, a hamlet in East Yorkshire, in 1850, George Edward Massee spent his youthful days on his father's farm. It was at this village where, to use his own words, "they attempted to educate me at a private school, but failed." It was intended that he should follow in his father's footsteps and be a farmer, so that on leaving school we see the youthful botanist performing the duties of ploughing, sheep washing, threshing, milking, and the like. It is in this practical routine work on the farm that Mr. Massee attributes a great deal of the success that he achieved in plant pathology. Many of the so-called plant diseases are due to cultural defects. As a farmer's son Mr. Massee is able to give practical advice, and in this respect he has the advantage over the man of purely academic training.'

'But as a young man George Massee had ambitions in life other than that of being a farmer. He had a great liking for drawing and Nature study. So it was that he was sent to the York School of Art, where he was fortunate in gaining the national medal of the year for drawing flowers from Nature. At the same time he studied chemistry and physics. At this time he was taken in hand by his relative, Dr. Spruce, botanist and traveller, and when not ploughing or working in the sheep-fold he worked hard at botany. Massee's gift of drawing from Nature stood him in good stead, and the illustrations of Dr. Spruce's classical work on Hepatics are mostly his work. It was at Dr. Spruce's suggestion that Mr. Massee went to the West Indies and South America to study plants and collect Orchids. He sent home *Oncidium macranthum*, the large golden-yellow flowered species, and one of the most handsome Orchids in cultivation, also *Nanodes Medusæ* (Medusa's), an Orchid with lurid purple and deeply fringed flowers that give it a most sinister appearance. The Andes, notably the eastern slopes and the great Brazilian Plain are, in Mr. Massee's opinion, far less known than darkest Africa, and from a botanical and zoological point of view there is no corner of the world that offers such a wide field to the explorer and collector. Among his many exciting experiences on this expedition were earthquakes.'

'Being an only son, his mother prevailed upon him to

stay at home on his return. So that we again see him dividing his energies between farming and botanical study, specialising in fungi and plant diseases. On his father's death he came to Kew and worked in the herbarium as a free lance, and in 1893 was appointed Principal Assistant (Cryptogams). During the twenty years that Mr. Massee has spent at Kew it is not too much to say that he has done more than any man towards elucidating mysterious fungus diseases. His name is as familiar and almost as widely known as the nefarious plant diseases of which he has made a special study. He has written books and voluminous articles in the leading scientific journals of the day. Among his most useful works may be mentioned the "Text Book of Plant Diseases," which has been superseded by his "Diseases of Cultivated Plants and Trees" (1910), a work that is necessary for the proper equipment of every gardener, farmer or forester. "British Fungi, with a Chapter on Lichens," is his most recent book, and this is beautifully illustrated by Miss Ivy Massee, his talented daughter. In collaboration with Professor Theobald he brought out the book, indispensable to rosarians, entitled the "Enemies of the Rose."'

'It is, however, as lecturer that Mr. Massee will best be remembered by those who have had the real pleasure of listening to him. He is a breezy Yorkshireman, and his perorations always ripple with good humour. He is beloved of Kew men, and an appreciation, obviously written by one who knows him well, appeared in the "Kew Guild Journal," 1908, from which the following extract is taken:—"No one who has heard George Massee lecture upon or talk about the department of science, of which he has long been a past master, could think the subject uninteresting; on the contrary, they would probably say that it was as exciting as romance. . . . His method—if it be method, probably it is the man himself—is not to talk learnedly about things, the common fault of lecturers, but to, as it were, pitch the subject before his class or audience, get them all round it, and then help them by means of comment, explanation, joke and gibe to take in as much of it as their capacity will stand." Few men know better than Mr. Massee how to sugar a pill, and however technical and otherwise uninteresting a subject may be, he has the happy knack of imparting it with good humour. The present writer well remembers a lecture by Mr. Massee on the diseases of fruit trees, wherein the lecturer impressed his hearers with the importance of keeping a constant look-out for the first signs of attack, concluding his remarks with the appropriate exhortation, "above all, watch and spray."'

Accounts of his life and work will also be found in the *Kew Guild Journal* already referred to, and also in an illustrated memoir issued by the 'Lloyd Library' of Mycology, in Cincinnati, Ohio.

1917 April 1.

Thirty or thirty-five years ago he lived at Scarborough, where he taught drawing and botany at some of the schools. A correspondent who evidently knew Massee well, wrote to the *Yorkshire Post* that 'Massee was a rare instance of an all-round naturalist. He was not only an "inside" man, but an "outside" man as well. He was a skilled laboratory worker, but not less he was a practical field botanist. There was no empiricism about him. He had nothing but scorn for 'would-be's' and people of little or no qualification who sought the limelight, but he was the essence of kindness to the real worker and seeker after knowledge. Unconventional and unpretentious, but intensely enthusiastic in his calling, he may be said to have devoted his life to the interests of botanical science. He found in life something he could do, and did it. His name is known in the five Continents, and his work appreciated, and while his death will be universally regretted, we who were privileged to know him intimately, feel intensely poorer for his removal. He leaves a widow and family to mourn his loss.'

To these we offer sincere sympathy. This is extended to our old friend, Mr. Alfred Clarke, of Huddersfield, and many other Yorkshire mycologists, whose friendship with Mr. Massee was very great indeed.

To Miss Ivy Massee, who is well-known to Yorkshire mycologists and inherits many of her father's gifts, we are particularly indebted for the photograph reproduced herewith. It is the last one taken of her father.—T.S.

——: o :——

R. H. TIDDEMAN, M.A., F.G.S.
(1842-1917).

Yorkshire Geology has to mourn another of its workers; in February, R. H. Tiddeman, so well-known and beloved by Yorkshire hammer-men, passed away. He was a quiet and conscientious worker and made many firm friends in the county in which he did so much good work. In appreciation of his services, he was elected president of the Yorkshire Geological Society in 1914, and during his period of office, he made special efforts to be with his friends at meetings and excursions; albeit often at great personal inconvenience.

Sir Roderick Murchison gave him the appointment as Assistant Geologist on the Geological Survey so long ago as 1864, and he remained in the service to until 1902, when he retired.

His principal work was in connection with the Carboniferous Rocks of Yorkshire and the neighbouring counties of Cumberland and Lancashire, which occupied twenty years. Later,

he worked in North Wales. He was naturally one of the greatest authorities on our Carboniferous rocks. Another excellent piece of his work was in connection with the exploration of the well-known Victoria Cave at Settle.

In 1911, the London Geological Society awarded him the Murchison Medal in recognition of his services to the science.

He was not a great writer; the Geological Survey Memoir

Photo by] [*H. E. Wroot.*

R. H. Tiddeman.

on the 'Water Supply of Oxfordshire' bears his name, and he contributed to many other Survey publications. In the field he was an ideal companion and guide.

He leaves a widow and two daughters to whom we extend every sympathy.—T. S.

——: o :——

Mr. W. Williamson writes on Water Mites in the *Scottish Naturalist* for February.

Among the obituary notices recently published we notice those of William Gray (aged 86), of the Belfast Naturalists' Field Club, and a familiar figure at the British Association meetings; Charles O. Waterhouse, the entomologist (aged 73), whose portrait appears in *The Entomologist's Monthly Magazine* for March: and J. Platt Barrett, entomologist (aged 77).

NEWS FROM THE MAGAZINES.

The Museums Journal for February contains a report on Museum Glassware, by Mr. E. E. Lowe.

The Geological Magazine for February contains some papers of exceptional interest. Prof. Grenville A. J. Cole writes on 'Rhythmic Deposition of Flint'; Dr. Aubrey Strachan on 'Geology at the Seat of War' and Dr. A. Smith Woodward on 'The Jaw of *Plectrodus*, a Silurian Fish.'

Wild Life for January contains well-illustrated articles on Finding a Shield-duck's nest; Leaf-rolling Beetles; Points in the Nightjar Symposium; on Spotted Flycatchers; Concerning the Picidæ; among others. The illustrations accompanying the notes on Spotted Flycatchers are especially fine.

In *The Lancashire and Cheshire Naturalist* for January, Mrs. R. S. Bagnall gives a list of Lancashire and Cheshire Midge-Galls; Dr. W. E. Collinge describes three new varieties of British Woodlice (from Cheshire, Derbyshire, etc.), and Mr. G. A. Dunlop has a paper on Coleoptera collected in 1915.

British Birds for March is largely occupied by Mr. J. H. Gurney's 'Ornithological Notes from Norfolk for 1916,' this being his 23rd annual report. These reports formerly appeared in *The Zoologist*. They are now arranged under species and other headings, instead of in diary form as was the case previously.

The *Irish Naturalist* for March has an account of Some Irish Ichneumonidæ; Measurements and Weights of Birds' Eggs; and a report of the Royal Zoological Society of Ireland, which contains details of the difficulties the Society had to contend with during the outbreak in Dublin in Easter week, 1916.

The South Eastern Naturalist for 1916, contains xciii. + 89 pages, and is a valuable record of the work of the South Eastern Union of Scientific Societies during the year. The papers read at Tunbridge Wells Congress, including the President's address, are printed in extenso. The frontispiece is a reproduction of the group taken at the Tunbridge Wells.

In *The Scottish Naturalist* for March, Dr. W. Eagle Clarke records 'An overlooked occurrence of the Black Lark in Great Britain,' recorded for Middlesex (Highgate), about 1737, and described and figured in Albin's *Natural History of Birds*, 1738. Thus the alleged 'first' record on the coast of Kent and Sussex, in 1907, is about 170 years too late. The same journal reprints Dr. W. E. Collinge's paper on 'The Economic Status of Wild Birds,' from the *Journ. Roy. Hort. Soc.*; and Mr. Percy H. Grimshaw concludes his notes on 'The British Lice (Anoplura) and their hosts.'

We quote the following two verses from a palæontological parable in *Punch*, entitled 'The Mammal-Saurian War':—

'The Saurians, clad in coats of mail,
Shone with a most attractive lustre;
Strong claws, long limbs, a longer tail—
They pinned their faith to bulk and bluster;
They laid their eggs in every land
And hid them deftly in the sand

The Mammals, small as yet, and few,
Relying less on scales and muscles,
Developed diaphragms, and grew
Non-nucleated red corpuscles;
They walked more nimbly on their legs,
And learnt the art of sucking eggs.'

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THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY
T. SHEPPARD, M.Sc., F.G.S., F.R.G.S., F.S.A.Scot.,
THE MUSEUMS, HULL;
AND
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WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.E.S.,
Prof. P. F. KENDALL, M.Sc., F.G.S., JOHN W. TAYLOR, M.Sc.,
RILEY FORTUNE, F.Z.S.

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JUN 24 1917
Natural Mus

NOTES AND COMMENTS.

WILD LIFE.

This interesting journal continues to cheer us with its beautiful pictures and well written articles. In the March number there are papers on 'A Welsh Sea-Bird Resort,' by R. Chislett; 'The Cockchafer,' by O. Warner; 'The Haunt of the Sea Fowl,' (the Farnes), by Charlotte Mason; and 'The Glutton or Wolverene,' by H. L. Townsend. There are 22 reproductions from fine natural history photographs, some of

Copyright: Ralph Chislett.

Guillemot Flapping its Wings.

which are mounted on tinted paper. One of them we are kindly permitted to reproduce herewith.

POSTPONEMENT OF EXCURSIONS FOR 1917.

In accordance with the National call for economy, and having regard to the curtailment of travelling facilities and increase of railway fares, the Executive Committee of the Yorkshire Naturalists' Union decided that the Excursion Programme arranged for the present year shall be postponed until 1918. We notice also that the British Association for the Advancement of Science will not hold its annual Conference this year, though the General Committee, and possibly the

Conference of Delegates, will be held in London. This is the first break in the continuity of the Association's meetings since its foundation in 1831.

'NEW' BRITISH (?) BIRDS!

In its April number *British Birds* has 'broken out' again, and badly! In less than a page, three 'new' species are added to the British list, and then follow eight pages of editorial comments thereon. In the first case, Mr. J. B. Nichols tells us that two Calandra Larks were shot at St. Leonards in May, 1916, and shown in the flesh to Mr. Ruskin Butterfield. Mr. Nichols, also, records an Eastern Great Reed-Warbler, also from St. Leonards ('picked up under wires'), also last year, and also examined in the flesh by Mr. Butterfield. Mr. T. Parkin records a Semi-Palmated Ringed Plover, also from St. Leonards, shown to him, in the flesh, by a taxidermist, in April, 1916.

DELAYED RECORDS.

In view of the apparent extraordinary importance attached to these records, is it not odd that these valuable additions to our fauna—made in April, May and August last year, are not given to the world until April, 1917? Why did not Mr. Butterfield tell the scientific world of the great things he had seen? It is admitted that, with regard to the Calandra Larks, two have previously been recorded. One *said* to have been got near Devonport and the other near Exeter, and were recorded in *The Zoologist* and the *Birds of Devon* at the time. But it is naïvely added 'these records have *very properly* never been accepted as authentic.' Why? Certainly Mr. Butterfield was not living then, and therefore did not see them 'in the flesh'; and *British Birds* was not then published. But, after all, we must remember that these new Calandra Larks were '*said*' to have been shot at St. Leonards; the Eastern Great Warbler was '*said*' to have been 'picked up,' and the St. Leonard's taxidermist '*said*' his Semi-Palmated Plover had been shot.

DEALERS' BUSINESS METHODS.

While this particular St. Leonard's taxidermist may be like Cæsar's wife, in some respects, we certainly do not like this periodical immigration of new British Birds in this one particular locality, and certainly do not feel justified in accepting the records as British on the evidence brought forward. A little while ago * we were able to investigate a case, and *proved* that a dealer had sold an imported bird as 'British,' and a new record at that; he did so as 'one is apt in trade to make the most and get the most,' and that the information about the alleged locality of the record 'was only business in sale.' †

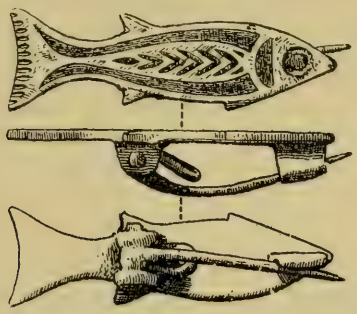
* 1915 pp. 3-5. † *loc. cit.* p. 60.

D'ORBIGNY.

Mr. E. Heron-Allen favours us with a copy of his Presidential Address to the Royal Microscopical Society* on 'Alcide d'Orbigny: his Life and Work.' d'Orbigny, whose work among the Foraminifera brought him to the front rank of naturalists, was born in 1802, and died at the comparatively early age of fifty-five. Mr. Heron-Allen has spent much research in connection with his theme, and illustrates his address by portraits, views of d'Orbigny's birthplace, his microscope, etc. There are also some remarkably fine coloured plates of Foraminifera.

A FISHERIES MUSEUM.

The Illustrated *Catalogue of the Museum of Fisheries and Shipping, Hull,* has just reached its fifth edition. It tells much about the old whaling days. There are four pages of particulars of exhibits added since the previous edition was



published. The objects shown in this Museum illustrate the growth and evolution of the fishing and shipping industries from the earliest times. One of the illustrations, showing a Roman enamelled brooch in the form of a fish, is given herewith. The original was found in North Lincolnshire a few years ago.

LITERATURE OF BRITISH DIPTERA.

Mr. Percy H. Grimshaw of the Royal Scottish Museum, favours us with a copy of his Vice-Presidential address to the Royal Physical Society of Edinburgh,† the subject being 'A Guide to the Literature of British Diptera.' Those who may have been under the impression that there is a paucity of literature dealing with the Diptera will be disillusionised on perusing these pages. Mr. Grimshaw enumerates over four hundred works, and he promises to publish a supplement with further information shortly. Due importance is attached

* *Journ. Roy. Micro. Soc.*, 1917, pp. 1-105.

† Printed in the Society's *Proceedings*, Vol. XX., Part 2, pp. 78-117. 2/-.

to the List of Durham Diptera by the Rev. W. J. Wingate, which originally appeared in *The Naturalist*, and was subsequently published in an extended form by the Northumberland Society. We hope and believe that Mr. Grimshaw's address was not delivered quite in the form in which it is published.

REPORT ON CETACEA.

We have received from the British Museum, Natural History, Dr. S. F. Harmer's ' Report on Cetacea Stranded on the British Coasts during 1916,' this being the fourth report, and is sold at 1s. 6d. Notwithstanding the adverse conditions for observation which now exist, some interesting records have been made, including ' A Cuvier's Whale, *Ziphius cavirostris*, believed to be the first specimen of this species recorded from the English Coast ; A Sowerby's Whale, *Mesoplodon bidens*, from Lincolnshire ; A White-sided Dolphin, *Lagenorhynchus acutus*, a common northern species which has seldom been recorded from British seas ; a Young Sperm Whale, *Physeter catodon*, with uncut teeth and presumably a " sucker ; " a Killer or Grampus, *Orcinus orca*, of exceptional and perhaps record size.' There are illustrations of the Killer from Colvend (South Scotland), and also a map showing the localities of the various specimens stranded during the year.

SANDS FOR GLASS MAKING.

As was shown in the report of the meeting of the British Association at Newcastle, the economic value of scientific work is being forcibly recognised in these days. We have already referred to special memoirs being issued by the Geological Survey, bearing upon minerals, etc., which are of special importance at the present time. From Messrs. Longman, Green & Co., we have received a memoir ' Published at the Instruction of the Ministry of Munitions of War, by the Imperial College of Science and Technology. A Memoir on British Resources of Sands suitable for Glass-making, with notes on certain crushed rocks and refractory materials. By P. G. H. Boswell. With Chemical Analyses by H. F. Harwood and A. A. Eldridge (92 pp., 1/6).' It deals with the uses, nature, composition and distribution of sands, the process of glass-making, and gives details of localities in England where suitable sands occur ; in Yorkshire at Huttons Ambo, Burythorpe, Guiseley and South Cave ; at Spital, in Cheshire, and other localities in Derbyshire, etc.

DERBYSHIRE CARBONIFEROUS LAVAS.

At a recent meeting of the London Geological Society Mr. H. C. Sargent read a paper ' On Spilitic Faces of Lower Carboniferous Lava-flows in Derbyshire.' The President (Dr. Alfred Harker) welcomed this contribution to the petrology of the Carboniferous lavas. The interesting alkaline types

described had been hitherto neglected, owing partly to a tendency to select for study the fresher-looking material. It would appear that in Lower Carboniferous times the British area included two petrographical provinces, both characterised by rock-types rich in sodic felspars, but having different histories. The southern or Cornish province was an old-established one, and was spilitic. The Somerset lavas must be included here. The northern province represented a reaction from the very different Caledonian régime, and was marked by the prominence of olivine-basalts and mugearites, with some soda-trachytes. Here belong the Scottish and Irish districts with the Isle of Man. In Derbyshire, occupying geographically an intermediate situation, the volcanic rocks seem to be mainly of Scottish types, but with spilitic affinities indicated in some of the occurrences.

THE OLDEST FLINT IMPLEMENTS.

Mr. J. Reid Moir has a paper in *Science Progress* on 'The Oldest Flint Implements,' in a little section to himself, with the heading 'Popular Science.' He refers to the well-known eoliths found in Kent over fifty years ago by Mr. Benjamin Harrison. These were described at the time by the late Sir Joseph Prestwich, as of human workmanship, an opinion which has been shared by dozens of other workers during the past half-century. After somewhat näively stating 'without troubling the reader with the somewhat complex geological facts which demonstrate the great antiquity of these primitive flaked flints,' Mr. Moir is of opinion that his examination of the specimens 'has indicated with some amount of certainty,' that they are of human origin, and modestly refers to 'tangible evidence such as has been set forth in this paper.'

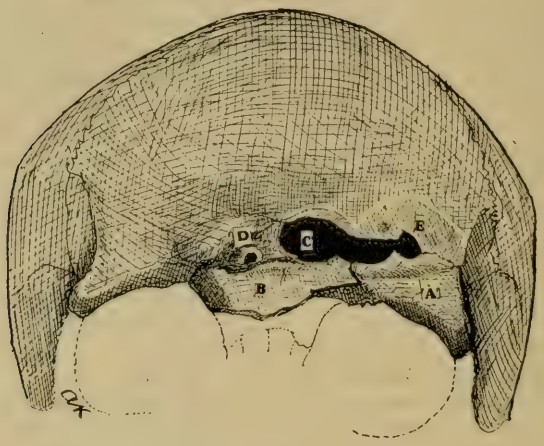
'POPULAR' SCIENTIFIC TERMS.

It seems a pity that Sir Joseph Prestwich has been dead so many years, as it is possible he may have received some encouragement in his work from the fact that Mr. Moir (who was not born when Sir Joseph's papers were written) adds his seal of authority to the correctness of Sir Joseph's views. We have some evidence of Mr. Moir's youth in his choice of adjectives in writing this 'Popular' science article. The flint implements he describes are *chocolate*-brown, or of a *café-au-lait* shade; some are *light chestnut* brown; others are *toffee*-coloured (a very 'popular' scientific description). We have failed to find any reference to brandy-balls or humbugs.

A PREHISTORIC WAR WOUND.

Lieut. L. F. West describes 'A Prehistoric War Wound' in *The British Medical Journal*. While excavating on the site of a prehistoric fort on the Wiltshire Downs, a human skull was found, which bore evidence of rough treatment.

'The wound seems to have been produced by the pointed end of the celt, which fell upon the supraciliary ridge over the left orbit with such a force that it sunk clean within the skull, eaving a sharp edged hole, about ¾ in. in one diameter, and ½-inch in the other.' The injury was not immediately fatal for there are signs of repair all round the wound. Dr.



Drawing of frontal region of prehistoric skull. A. External angular process. B. Supranasal region C. Primary perforating wound. D. Sinus leading to frontal air cell. E. Part which has been attenuated either by scraping or by absorption.

Keith, to whom we are indebted for the loan of the illustration, also has a note on the specimen.

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Birds and the Storm.—During January and part of February, the birds in this district suffered very much owing to the effect of the severe and lasting storm. On the moors the snow being very deep, and freezing hard on the surface, the grouse were in many cases unable to obtain food. They consequently migrated to the lower lands in search of it. A number was seen within the boundaries of Harrogate and in the fields on the outskirts. On one farm for a few days, a pack of at least two thousand birds could be seen. One grouse perched in a tree in Harrogate and remained there for some time, despite efforts to dislodge him by soldiers and boys, and it was only upon the approach of a boy who climbed the tree that it opened its wings and sailed away. Many redwings, always heavy sufferers in such weather, were picked up dead. In my garden for some time fourteen species of birds came regularly to the food laid out for them.—R. FORTUNE, Harrogate, February 28th, 1917.

A HOARD OF AXES, ETC., OF THE BRONZE AGE, FROM SCARBOROUGH.

T. SHEPPARD, M.Sc., F.G.S.

(*Plates II. and III.*).

WHILE the wastage of the Yorkshire Cliffs is deplorable, the result is sometimes of advantage to the geologist and antiquary. Recently, in the vicinity of Scarborough, the fall of a cliff revealed a hoard of bronze implements which, though picked up piecemeal, is now gathered together again, and has been placed in the Municipal Museum at Hull. The collection consists of twenty pieces of bronze, many of which were evidently destined for the melting pot, and doubtless formed the stock-in-trade of some metal-worker of the Bronze Age. In consists of 12 fairly perfect socketed axes, and portions of three others, two pieces of a large spear head, the handle of a sword, a socketed gouge, and a socketed chisel; all in bronze. Four of the socketed axes are of the typical East Yorkshire form, such as usually occurs in the district, and represented in the hoards found at Leppington, Sproatley and other places. They are of the type shown in figure 164 of 'The Ancient Bronze Implements of Great Britain' (1881), by the late Sir John Evans. They contain, however, one or two interesting features.

Fig. 1 is a well-made implement, $3\frac{1}{4}$″ in length, $1\frac{1}{2}$″ at the cutting edge, and $1\frac{1}{2}$″ square at the socket. It is provided with a loop, and is decorated on the two sides with three parallel lines, extending from the collar to about half-way along the length of the axe. On the inside is a prominent central ridge, extending about three-quarters of the distance of the wedge-shaped hollow in the axe. The implement has a small hole, about $\frac{1}{4}$″ in width, near the loop on the left-hand side, evidently a flaw in casting, which has doubtless destined the axe for the melting pot before use, as the lines where the two valves of the mould met are still prominent, and the cutting edge is in its rough squared shape, instead of being hammered out and sharpened. It is clear that this particular implement has never been in use.

No. 2 is of the same length, and the square socketed end is also $1\frac{1}{2}$″ across. It is provided with a strong loop, and has evidently been in use. The cutting edge has been hammered out and sharpened, though is now somewhat blunt, due partly to oxidization. There is no well-marked collar, and each side of the axe has three slight ridges, extending for about half the length. On one side they are equi-distant, and on the other not quite; the second line being nearer one side

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than the other. There is no ridge on the inside of the casting. On the right hand side of the axe, towards the cutting edge, is a hole $\frac{3}{4}'' \times \frac{7}{8}''$ across, which is evidently an old fracture, and probably resulted in the specimen being put aside for the melting pot.

No. 3 is a somewhat similar type of weapon, but it has a feature which has not previously been observed by the present writer on a socketed axe of the Bronze Age. The loop for secure shafting has evidently been imperfectly cast, and has been broken away. To assist in securing the axe to the shaft, a circular hole has been carefully drilled from the outside, midway between the two points of attachment of the loop. This is $\frac{2}{5}''$ wide on the outside, and $\frac{1}{4}''$ wide on the inside of the axe. The implement, which has obviously been in use, has been sharpened, and like the two already described, has three parallel ridges on each side, extended downwards, from a well-marked collar. The wedge-shaped cavity in the axe is perfectly plain; a small portion is missing from the collar on the right-hand side.

No. 4. A well-made axe with the cutting edge well turned and finished. There is only the merest trace of a collar, and the three lines extending therefrom are rather indistinct. There are the usual ridges inside the socket. It is $3\frac{1}{8}''$ long, by $1\frac{1}{2}''$ across the socket, the cutting edge being $2''$ from point to point. A portion of the left side of the collar has been broken recently, but is preserved.

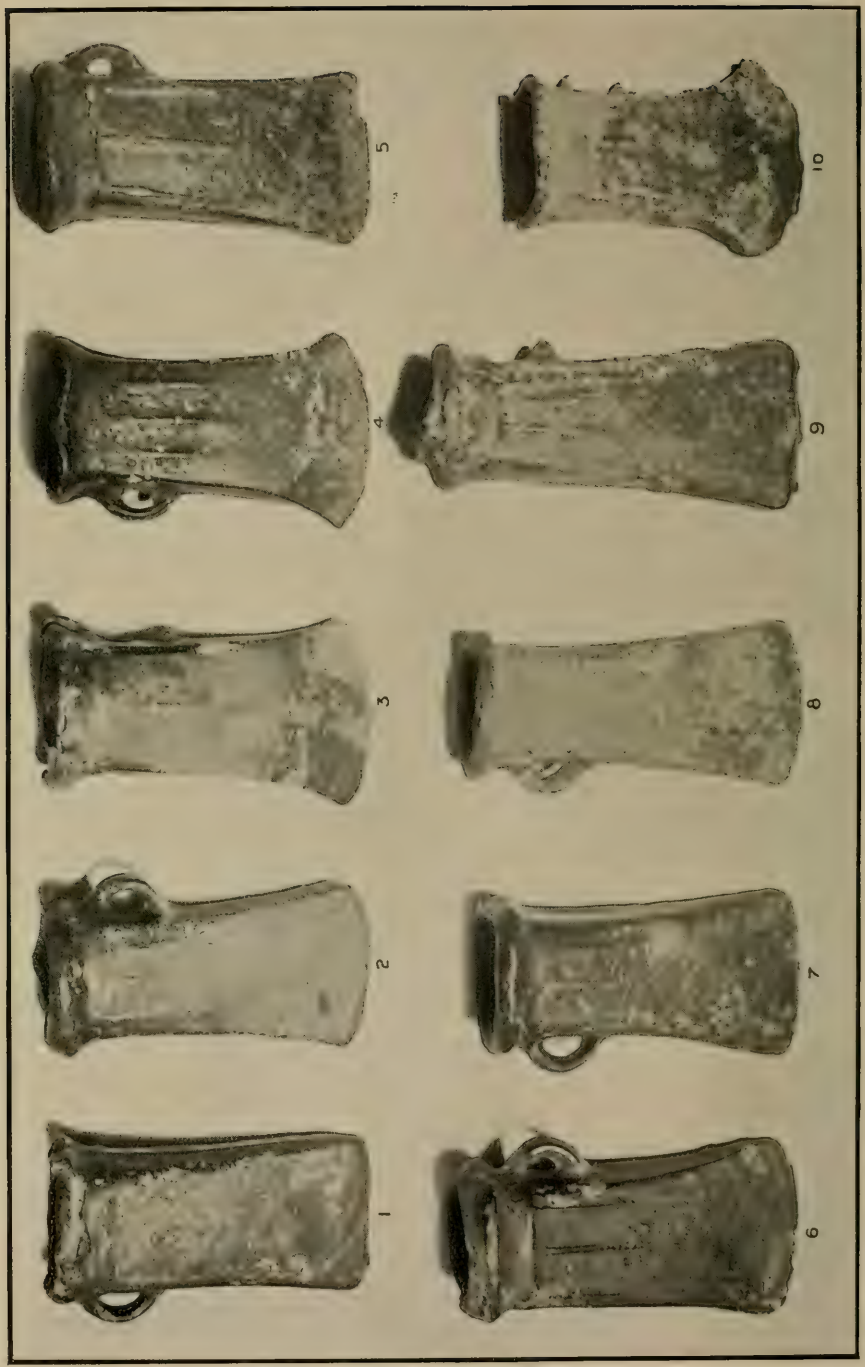
No. 5. This is very similar to No. 1 in every respect, and has probably been cast in the same mould. It has, however, been slightly hammered out at the cutting edge.

No. 6 is of a somewhat similar type, though the three ornamental ridges are irregularly done, especially on the right side of the axe, and there is a slight ridge on each side in the socket. It is quarter of an inch longer than No. 5; in other respects the description holds.

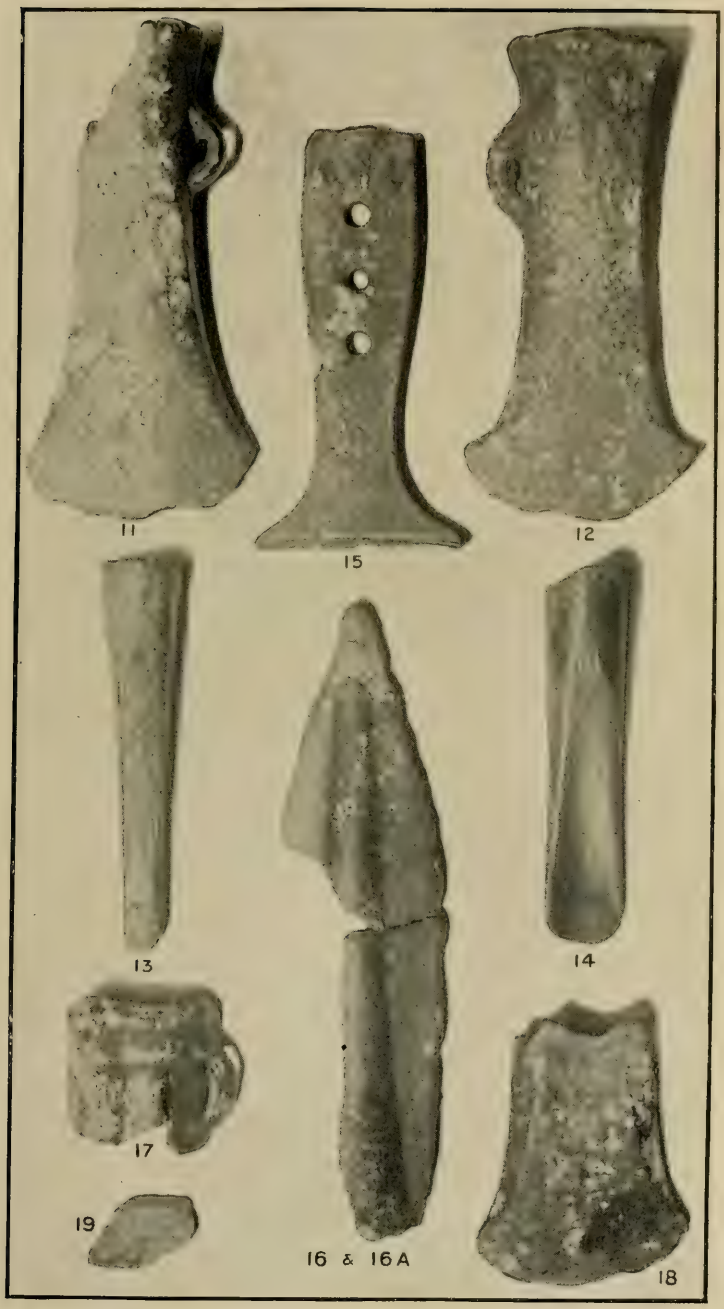
No. 7. Like No. 1, this is a casting in the rough, as turned out of the mould, and has not been finished off and sharpened, though the weapon is quite perfect and in good condition. There is only a suggestion of a collar, and the three lines extending therefrom are very indistinct. It is $3\frac{1}{4}''$ in length, $1\frac{1}{2}''$ each way across the socket, $1\frac{3}{4}''$ along the cutting edge, and there are no ridges inside the socket.

No. 8. A rather narrower celt than those already described, and, though it has a well-marked collar, the usual three lines extending therefrom are missing, and there are no ridges inside the socket. It is $3\frac{1}{2}''$ long, $1\frac{3}{8}'' \times 1\frac{1}{4}''$ across the socket; the cutting edge being $1\frac{3}{4}''$.

No. 9. This axe is longer than any of those described, and is rather squared in construction, after the manner of the



Part of the Scarborough Hoard.



Part of the Scarborough Hoard.

French type of celt. It is just as turned out of the mould, and apparently two flaws, as well as an imperfectly cast loop, destined the specimen for the melting pot. In shape, it resembles Evans's No. 137. There is a well-marked collar, from which three lines at unequal distances apart, extend half the distance down the blade. The axe is four inches long, the socket is $1\frac{1}{2}'' \times 1\frac{3}{8}''$, the cutting edge is $1\frac{5}{8}''$ long, and there are no ridges inside the socket.

No. 10 is smaller than the examples described, and the cutting edge, has been well hammered out, in this respect more resembling No. 149 of Evans. It is $2\frac{3}{4}''$ in length, $2''$ wide across the cutting edge, and $1\frac{2}{5}''$ by $1\frac{1}{4}''$ across the opening. There is a well-marked collar, with the usual three lines extending therefrom on each side of the axe, and inside there is a slight ridge on the right and left. A portion of the loop is missing, and part of the collar on the right-hand side is broken away.

No. 11 is a very different type of socketed axe, being very similar to Evans's No. 150 in general outline, though in ours there is no collar, no parallel lines, no chamfered edges; in fact the axe is devoid of decoration of any sort. The length of the implement is $4\frac{3}{4}''$, the width across the cutting edge $1\frac{3}{4}''$, and when complete would be about $1''$ each way across the opening, though this part of the axe is slightly broken. The wedged-shaped hollow inside the axe is perfectly plain. There is a small well-made loop, and all trace of the line made by the two halves of the mould has disappeared.

No. 12. This axe somewhat resembles No. 11, though the corners of the cutting edge are hammered out more acutely. Like No. 11, it is perfectly plain, but is more cylindrical in section. The socket is also cylindrical, but tapers to a wedge-shaped end at the bottom of the axe. In cleaning out the material which still remained inside when received, I found, wedged at the bottom, the thin end of the original wood shaft, which had evidently been quite sharp, in order to fit the socket. The wood is apparently ash. The length of the axe is $3\frac{5}{8}''$; it is $2\frac{1}{4}''$ across the cutting edge; the socket is $1\frac{1}{2}'' \times 1\frac{1}{4}''$.

No. 13 is a type of bronze implement not previously represented in the Hull Museum Collection. It is a well-made socketed chisel, $3''$ in length, nearly circular at the top, and square towards the point, which is $\frac{1}{4}''$ across. At the socket it is $\frac{2}{5}''$ wide, and the hollow for the reception of the shaft is somewhat squared, and extends a little more than half the length of the chisel. Three somewhat similar chisels were found with a hoard at Westoe, Yorkshire, many years ago, one of which is figured by Evans (No. 201). One of the Westoe chisels has a square socket like the specimen just described.

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On this chisel the lines showing where the two halves of the mould met are clearly shown.

No. 14 is another somewhat unusual type of bronze implement, namely, a gouge. It is similar in general appearance to the chisel already described, but is circular in section at the top, from which a gradually increasing grove terminates in a curved edge in the form of a hollow chisel, and was evidently used for working out rounded or oval holes. This specimen is 3″ long, $\frac{3}{5}$″ wide at the top, and slightly over half-an-inch at the cutting edge. The socket is conical and extends three-quarters of the length of the implement. The mould marks are clearly shown at the sides, and the implement is devoid of ornamentation. In type it comes midway between Nos. 204 and 208 of Evans.

No. 15. This is a handle of a bronze sword, which has been cut off at the point of junction with the blade. The sharpness of its edges suggests that it has possibly not been in use, and owing to some defect in the casting has been cut into sections for the melting pot. It is slightly over 3″ in length and $1\frac{3}{5}$″ across at the broad end, and $\frac{1}{5}$″ in thickness. There are three circular holes bored for the purpose of securing the haft of bone or other material, and from the first of these to the broken edge is the end of a gradually widening ridge, which originally extended along the blade, at each side. This handle is larger than the handle of a complete sword which was found at Leven, now in the Museum at Hull, but otherwise it is similar. The Leven example, however, has only one hole in the handle and two at the top of the blade, being practically identical with Fig. 355 of Evans.

No. 16 is the pointed end of a large socketed spear, with a prominent central rib, which was cast hollow. The fragment is $2\frac{1}{2}$″ long × $1\frac{1}{4}$″ wide, and is apparently portion of a very similar weapon to one from Nettleham, Fig. 382 of Evans.

No. 16*a* is a further portion of the same spear-head, and the two pieces fit together. In this case only half the width of the spear is preserved, but it indicates that the socket extended the whole length towards the point. Probably when complete the spear-head would be 8″ or so in length. This fragment measures $2\frac{1}{4}$″ × $\frac{3}{4}$″.

No. 17 is the upper portion of a socketed axe, similar in type to Nos. 1 and 3, showing a well-marked collar, and with the loop preserved. It measures $1\frac{1}{4}$″ × $1\frac{1}{4}$″.

No. 18 is the lower portion of a rather finely made socketed axe, which has been broken in two for the melting pot, and in the process the sides have been almost hammered together. The cutting edge is $1\frac{3}{4}$″, and the length of the specimen $1\frac{1}{4}$″.

No. 19 is a small fragment, possibly from No. 17, or it may be from No. 11.

SOME WEAPONS OF THE BRONZE AGE, RECENTLY FOUND IN EAST YORKSHIRE.

T. SHEPPARD, M.Sc., F.G.S.

(*Plates IV. and V.*).

In addition to the preceding hoard, a number of other Bronze Age weapons, of somewhat unusual type, from East Yorkshire, are in the Hull Museum, most of which have been acquired comparatively recently.

No. 20 is a socketed axe head of the ordinary type, from Hutton Cranswick. It is $3\frac{1}{2}''$ long, has a squared socket, and is provided with a loop, has three short ridges proceeding from the collar on each side, and has prominent mould marks. There is a ridge on each side of the socket, to assist in hafting. This axe, however, reveals a feature which I have not noticed previously, and it does not seem to have been observed by Evans. Within the cutting end is a mass of lead, which has been introduced into the casting, though it leaves quite a sixteenth of an inch of bronze on the outside of the axe. The lead however, seems to have burst the bronze casting, which is cracked and thrust outwards on both sides.

No. 21. An unusually small bronze axe of the palstave type, found at Bridlington, which for many years has been in the possession of a Bridlington collector. Generally speaking, it is rather flat and very much resembles in size and shape an example from Ireland, figured by Evans (No. 29). It is $3\frac{2}{5}''$ in length by $\frac{2}{5}''$ across the cutting edge, nearly an inch in width, and $\frac{1}{5}''$ in thickness. The edges have been hammered over slightly, and there is a cross ridge about half-way up, to assist in the shafting.

No. 22. Another small bronze axe of the palstave type, but with very large wings, is from the Yorkshire Wolds. It is $3\frac{4}{5}''$ long, and $1\frac{1}{2}''$ across the cutting edge. There is no stop for the shaft. In this respect the axe resembles No. 53 of Evans, but in his book there is no illustration quite like this example.

No. 23 is a fine massive palstave from Ripon. It is $5\frac{1}{2}''$ in length, $2\frac{1}{2}''$ wide, the wings, which are very pronounced, are $1\frac{1}{2}''$ across, and there is a slight ridge or stop with traces of a semi-circular decoration attached to it. The cutting edge has been well hammered round, the points being turned back in the form of hooks. As in the previous and following examples, there is no loop. Evans does not figure anything quite like this, his nearest apparently being an implement from Reeth (No. 56).

No. 24 is very similar in type to the last, except than it is a trifle smaller and the wings are relatively much wider. This

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is from Hutton Cranswick, and measures 5″ in length, 2″ across the cutting edge, and 1¾″ across the wings. On the casting there seems to be evidence that the mould has been altered at a later date for the purpose of adding these large wings.

No. 25 is a well-made socketed spear-head, of lanceolate form, from Swine. It is based upon a large conical socket for the shaft, 5″ in length, on the sides of which for a length of 3½″ are two small knife-like projections, forming the spear. The socket, which is conical, extends to ½″ from the point, and at a distance of ½″ from the bottom, a hole is bored through opposite the blade on each side, evidently to take a rivet for secure hafting. This specimen is exceptionally well preserved, and in type resembles Evans No. 386, from Reach Fen.

No. 26 from Hutton Cranswick, is a much more delicate type of implement, with a longer shaft, and with flattened side loops, an inch from the socket, for the purpose of attachment. The socket is conical, and extends to a 1¼″ from the point. The blades are 2⅝″ long, and are nearly an inch across at the widest part. Evans does not figure one of this type, his nearest form being from Laken Heath (No. 395).

No. 27 is a portion of a very well-made and finely-cast spear head from the Yorkshire Wolds. On each side of the conical medial ridge is a well-defined hollow, beyond which the spear head tapers to a knife edge. The point is missing, and apparently at the place where the spear is broken were two holes for either ornament or attachment. The specimen is 4½″ in length by 1½″ in width, and half-an-inch across the socket, the hollow extending in the spear head for 1½″. A part of the shaft has been carefully cut or broken all round, in order that the spear head might still be used in its shortened form. Originally it was probably 2½″ longer in the shaft. Evans figures an example from Elford in Northumberland (No. 405), which our example exactly resembles.

Fig. 28 is a very rare type of implement, which had not previously been represented in the Hull collection. It was found at Bridlington many years ago, and after passing through various hands, reached Hull. It is of the type of blade known as a halberd, rather than a dagger, and of these, the late Sir John Evans states they are by no means common in England and Wales, though they occur occasionally in Ireland. Evans mentions only four examples from England and Wales, viz., from Westmorland, Shropshire, Cambridgeshire, and Norfolk. The first mentioned is figured (No. 337), and would somewhat resemble the Bridlington specimen. In this however, a small portion at the point is missing, and the opposite end, which originally would have three or four rivet holes, is also broken away. At some time this broken halberd has been used as

Bronze Age Weapons from East Yorkshire.

Bronze Age Weapons from East Yorkshire.

a chopper, and for about half its distance, on one side, is considerably blunted, though evidently it was done a long time ago, and it was in this condition when found. Like the Northumberland example, there is a broad low central ridge, which gradually tapers towards the point, outside which the edge of the halberd is reached, after passing two smaller ridges at the sides. The specimen in its present state is $7\frac{3}{4}''$ long, and $2\frac{3}{4}''$ wide at the bottom and $\frac{9}{10}''$ across at the pointed edge. When complete it would probably be 9″ or $9\frac{1}{2}''$ in length, and nearly $3\frac{1}{2}''$ across at the widest part.

The last specimen to be described, No. 29, was dug up in Holderness while ploughing. It is evidently the point of a plough-share of the Bronze Age. The top and bottom are quite rounded and, like the point, is blunt. The socket is oval and extends to within an inch of the point. The hole on each side evidently enabled a rivet to fasten the point to the plough. It is $5\frac{1}{5}''$ long, and at the top of the socket $1\frac{3}{4}'' \times 1''$ across. Evans does not mention anything of this kind in his book, but I saw one precisely similar to this, figured in the Transactions of an Antiquarian Society in the south of England, a little while ago.

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Cumberland Mosses.—The following mosses were gathered in the Caldbeck district, and on the surrounding hills, in mid Cumberland. All doubtful species were submitted to, and kindly verified by, Mr. William Ingham, B.A. :—*Andreæa petrophila* Ehrh., common on rocks on Carrock Fell. *Dicranoweisia cirrata* Lindb., a small form on the ground in Roughtin Gill. *Campylopus atrovirens* De Not., at the foot of High Pike. *Grimmia pulvinata* Sm., on rocks and walls, common. *G. Doniana* Sm., on rocks in Roughtin Gill. *Rhacomitrium heterostichum* Brid., abundant. *Encalypta streptocarpa* Hedw., on wall in Hesket Newmarket. *Ulota crispa* Brid., in a wood below Park Head, on Oak. *Tetraplodon mnioides* B. and S., Carrock Fell, on ground at 2,000 feet. *Philonotis fontana* Brid., in boggy places in Roughtin Gill, and high up on High Pike. *Webera nutans* Hedw., top of Carrock Fell (2174 feet), on ground. *Bryum inclinatum* Bland., Roughtin Gill, on ground. *Neckera complanata* Hubn., stone wall in Caldbeck village. *Anomodon viticulosus* Hook. and Tayl., at tree roots in the ' Howk.' *Pleuropus sericeus* Dixon, fruiting specimens on a wall in Caldbeck. *Brachythecium purum*, Dixon, found with fruit on a hedge bank on Warnel Fell. *Hylocomium triquetrum* B. and S., abundant in the ' Howk.' Among Hepatics, I found the rather uncommon *Lophozia Fleorkii* (W. and M.) Schiffn., growing on rocks on Carrock Fell.—Jas. Murray, 2 Balfour Road, Carlisle.

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NOTES ON THE WOOD ANT (*FORMICA RUFA*).

J. T. SEWELL, J.P.,
Whitby.

RECENTLY when examining some old natural history notes, I found the following entries made in 1893-4, at which time my business constantly took me through the Arncliff woods near Glaisdale ; it was in these woods that the ant nest subsequently referred to was observed.

This nest, built on the level, was composed, as is usual, of twigs, the needles of the fir and other vegetable matter ; it was frequently several feet across and raised from one to probably three feet in the centre ; during one period (possibly owing to the still weather), it was built on a narrower base, and higher, the apex being divided into two small cones, with an entrance low down in each cone, the contour somewhat resembling in miniature the illustration of the nests of the African Termite.

1893 APRIL 25TH.—Have had a very fine and dry early spring, with scarcely a day's rain since the beginning of March, the drought getting serious ; to-day very hot, the ant nest extraordinary—to which I was attracted by the noise—the ants were like a swarm of bees, and the noise like the patter of rain on dry leaves ; the surrounding ground was seemingly in motion, as the straws, twigs and leaves were being dragged to the nest ; a wasp also was being taken to the larder.

MAY 23RD.—Ants very lively, many having wings, walking about ; thundery weather.

JUNE 19TH.—Nothing to report ; late spring has been very wet.

JULY 18TH.—Ant nest not so busy as previously ; it is much flattened ; probably many ants have been drowned by the rain, ferns previously seen growing through the nest have been killed ; ants working into the roots of an adjacent tree ; they also appear to have formed nests at the base of the lower branches of a fir, on the trunk of which they are passing up and down ; several small nests have been formed around the original one.

AUGUST 15TH.—Ant nest much the same as at first, viz., one main nest, on which the aphis 'cows' are seen being milked by the ants ; weather very hot.

SEPTEMBER 12TH.—The nest has a bad smell, fermentation having probably taken place ; during the past month the nest, which looks very wet, has been raised very considerably ; only a few ants to be seen.

OCTOBER 10TH.—Very few ants to be found and these only under a decayed tree root.

NOVEMBER 7TH.—No ants ; a rabbit, or badger (?) has burrowed into the midst of the nest and scattered it ; a good deal of snow.

1894.—The ant nest is again in the same place.

MARCH 27TH.—Easter ; weather hot, 65° in the sun to-day ;

ants out sunning themselves, great numbers continually swarming out of their holes in the side of the nest, climbing over one another, and gathering into a little living ball at the hole' entrance, until becoming top-heavy, the foothold gives way and the cluster rolls down the side of the nest. They are very shiney, as if just emerged from the pupa state, and at first sight look like black buds belonging to the twigs to which they cling; the bright red of their legs, however, betrays them. The ants are not seeking food, nor collecting building material; some appear very savage; there are many lying dead beside the nest.

May 22nd.—The nest well built up, a few ants with wings crawling about; the sun coming out while I was still examining the nest; the latter soon swarmed with winged ants. May 18-20th had been very cold, with much snow; a sharp frost on the night of the 21st (compare the same date last year).

June 19th.—Ants greatly excited, possibly colonies going off? I saw what I imagine to be three separate queens, out for an airing. Distinct sets of ants appear to use different entrances; is this a 'colonial' family, *i.e.*, the members uniting to build a common shelter, but having separate apartments?

July 17th.—Top of the nest divided into two distinct cones with an entrance near the base of each cone; nest more column shaped than usual.

September 14th.—Nest recovered its old shape; food providers busy. I have not noticed any bird or other foe preying on the ants.

October 9th.—A few ants still carrying food; sorry I have not been able to trace the extent of their collecting area.

November 6th.—The nest is still in order, but only saw one or two ants. A squirrel collecting beech nuts near by.

The above notes were taken, in each case, at about the same time of the day, about noon. In 1895, there was no ant-hill at this place, although 1894 had finished up, as far as we can judge from the ant point of view, very favourably, the year having seemingly been more prosperous than the preceding one, judging from our notes; we wonder if the summer conditions extending into autumn, in contrast to the wet 'back end' of 1893, had any effect in causing less foresight for the future? On the other hand, our notes show us that the apparently disastrous ant year in 1893 was followed by a prosperous and larger settlement. The nest was in rather an exposed position where the winter winds would play havoc with it, if not covered by snow.

A local farmer told me how he saved the replanting of his turnip field at a time when his seeds were suffering from a bad attack of fly, by carting a similar ant hill into the middle of his field.

YORKSHIRE COLEOPTERA IN 1916.

W. J. FORDHAM, M.R.C.S., L.R.C.P., F.E.S.,
Bubwith.

SINCE the publication of the report of the Yorkshire Coleoptera Committee, several additional records of interest have come to hand.

Mr. G. B. Walsh reports the following :—

Philonthus varius Gyll. var. † *bimaculatus* Gr. Hotham Carrs, April, 1915.

†*Bledius erraticus* Er. One under a stone on a bank of sand and shingle in the River Swale above Richmond.

Also the following species which he took when on a visit to the writer at Bubwith :—

†*Cerylon fagi* Bris. One under rotten ash bark in garden. (This Ash stump has furnished me with several interesting beetles, including *Litargus connexus* Geoff. (*bifasciatus* F.) and *Scaphisoma boleti* Pz.).

**Stenus ater* Man.
Stenus vafellus Er.
†*Ceuthorhynchus rugulosus* Hbst. } in moss by the River Derwent in Bubwith Ings.

I find that I have an unrecorded specimen of the latter insect taken in the house at Bubwith in May, 1909. It is a not uncommon species, but has hitherto been overlooked in Yorkshire.

In December, 1916, I sent a small sample of flood refuse from the River Derwent to one or two entomological friends. Mr. E. A. Newberry, in this, found among other species :—

**Cercyon marinus* Th. (*aquaticus* Brit. Cat.).
**Abræus globosus* Hoff., and
**Helophorus granularis* L. (*brevicollis* Th.).

The species obtained by Mr. W. E. Sharp include :—

Bembidium lunulatum Fourc. (*riparium* Ol.).
Anthracus consputus Duft. (a previous specimen from Bubwith flood refuse is so far our only Yorkshire record).
**Pria dulcamaræ* Scop., and
**Longitarsus castaneus* Foud.

With reference to the report for 1916, I believe that *Oxypoda longipes* Muls. is new to the county and not merely to V.C. 61.

The dagger and asterisk, as in previous lists, refer to New County and Vice-County Records respectively.

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In *The Entomologist's Record* for February, Dr. T. A. Chapman has illustrated 'Notes on Early Stages and Life History of the Earwig (*Forficula auricularia*).'

THE GEOGRAPHICAL DISTRIBUTION OF THE MOTHS OF THE SUBFAMILY BISTONINAE.

J. W. HESLOP HARRISON, M.Sc.

VIII.—THE GENUS ZAMACRA (MEYRICK).

Zamacra.

Sub-genus *Acanthocampa* (Dyar.). Species with two pairs of spurs on the posterior tibiæ.

Acanthocampa excavata (Dyar.). Distribution :—Japan.

Acanthocampa diaphanaria (Püng.). N. Persia.

Sub-genus *Zamacra* (Meyrick). Species with one pair of spurs on the posterior tibiæ.

Zamacra flabellaria (Heeg.). N. W. Africa, Greece and its islands, Sardinia, Sicily, Asia Minor, Cyprus, Syria, Armenia and Mesopotamia.

Zamacra marocana (Dognin). Morocco.

Zamacra juglansiaria (Graes.). Ussuri district and Japan.

Zamacra okamotonis (Mats.). Japan.

Of lepidopterous freaks, *Zamacra* is one of the strangest, with its huge plumose antennæ, its curious narrow triangular wings and the reduced genitalia in both sexes ; and these latter unique features mask its affinities and cause great difficulty in assigning it to its correct position. In spite of its anomalies, careful study shows that everything in its structure is purely Bistonine, and its genitalia, when analysed point by point, only serve to emphasise this.

To determine its point of attachment to the main Bistonine line is still, however, a difficult problem. Its plumose male antennæ indicate that it originated early, as this character seems to differentiate Bistonine forms developed in early Pliocene (or possibly late Miocene times) ; whilst the existence of species within its limits provided with the full complement of two pairs of spurs on the posterior tibiæ shows that it is a transition genus evolved just when the Non-Boarmioid forms were in the making. Again, its peculiar half-developed wings suggest that it arose at a time when the first wingless mutations occurred, and when this feature was not sexlinked but was passed on in a manner showing blending inheritance. But this combination of plumose antennæ, double-spurred tibiæ, and incipient female apterousness was only possible at some point between the evolution of *Megabiston* and *Phigalia*—and appealing to its larva for indications—we find that its larva is spined or humped ; thus its origin is thrown near to that of *Phigalia*. Now both *Megabiston* and *Phigalia*, as their distribution, particularly that of the former, proves, are of North-eastern Asiatic origin. From this, it is clear that *Zamacra* was cradled in the same area ; and this is rendered the

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more certain by the occurrence of its most primitive double-spurred species *Zamacra excavata* side by side with the one-spurred form, *Z. juglansiaria* in Japan.

Very probably, the genus arose at some point northward of its present area and, with other forms of late Miocene and early Pliocene origin, was forced southward along the coast and into the warmer coastal plain which then embraced not only the present coast, but also the basin of the Yellow Sea and Japan by of the approach of the Ice Age.

The discovery of the species with two pairs of posterior tibial spurs alongside those with only one pair shows that, even in these early days, the tendency of the Non-Boarmioid *Bistoninæ* to lose one pair had already manifested itself and, consequently, the final separation of Japan from the mainland shut off species of both sub-genera.

However, *Acanthocampa* occurs in North Persia, whence we see that both sub-genera had early begun to send offshoots along the route adopted by the earliest horde of Eastern Asiatic migrants pressing into Europe. These, in all probability, skirted the southern shores of the great Central Sea of early Pliocene Asia, passing between it and the long uplifted Altai and neighbouring mountains. When *Acanthocampa* had reached Persia, its momentum seems to have been spent, for the sub-genus is lacking further to the west; it is not so, however, with *Zamacra*, for it reappears just west of *Acanthocampa* in Mesopotamia in the very familiar form of *Zamacra flabellaria*. On reaching the Tigris, it had swept onward into Syria and Asia Minor. No northward course was open for the Asian Sea barred the way. Evidently, when it arrived in Syria, the early Pliocene disturbances which tore that land asunder had already set in for *Z. flabellaria* failed to pass into Egypt. Instead, it marched forth from Asia Minor into Greece which then, with Asia Minor, Cyprus and Crete, formed one continuous land mass.

From this area, if one judges from its distribution now, it has pursued a most erratic and, in the light of present day geography, an impossible course. It seems to have passed on from Greece to Sicily without entering Italy — an extraordinary occurrence. But why, we ask, does this strange failure in Italy exist? The answer is plain. When *Z. flabellaria* was moving, Italy, as we know it, was yet a land of the future. All that was developed in early Pliocene times was a rocky peninsula jutting out from the Alps into the Early Pliocene North-western Mediterranean Sea. In its place, there was a huge tract of land stretching westward from Greece and embracing Crete, Sicily, Malta, Sardinia, Tunis and Morocco. That such a mass then existed can be proved, independently of any consideration of the western Mediterranean Flora and

Fauna of to-day, by an examination of the Pliocene fossils of Malta and Crete. These include abundant remains of elephants and hippopotami. These forms argue the presence of considerable land areas supporting enormous forests whilst the latter animals prove that this land was intersected by many noble rivers.

If we appeal to present conditions, then the Arctiad genus *Ocnogyna*, with its local species on all of the several portions of this long lost continent, no matter how small, abundantly proves the same proposition: and as equally weighty evidence the existence of the Cedar of Lebanon (*Cedrus libani*) in distinct local races on Mount Lebanon in Syria, and in the mountains of Northern Africa may be adduced.

Over this land, far and wide, *Zamacra flabellaria* spread, extending as far northward as Sardinia. Yet, when it occupied the Pliocene Sardinian peninsula, the break up of Tyrrhenis (adopting the name suggested for this sub-continent) had already commenced. Whilst Corsica and Sardinia had been disjoined from South France* since early Tertiary times, as the paucity of Alpine plants and animals common to the Maritime Alps and the two islands proves, and the number of endemic forms like the butterflies *Argynnis elisa* and *Papilio hospiton* found only in these two islands confirms, still for ages they had been one as the presence of common endemic forms shows. Nevertheless, when *Z. flabellaria* occupied Sardinia, Corsica was even then an island and no passage was open; this early break between Corsica and Sardinia is rendered the more vivid by the numbers of peculiar Corsican species, exemplified by the moths *Aegeria anthraciformis*, *Ellopia pinicolaria* and *Orgyia rupestris*, to be obtained.

Toward the south-west, however, advance was still possible, and following the routes traversed by such migrants as the Painted Frog (*Discoglossus pictus*) and the Greek Tortoise, at length Tunis was reached and immediately afterward Algeria and Morocco colonised. At some period subsequent to this, in the Moroccan area, the species *Zamacra marocana* has been evolved from *Z. flabellaria*.

When, finally, *flabellaria* reached its "furthest west," the Straits of Gibraltar had already been formed and it found its passage into the Spanish Peninsula closed; its wanderings thus had been much more delayed than many of the early members of the first Oriental migratory wave. This would indicate that the Straits of Gibraltar were formed not long after the inauguration of the Pliocene epoch. Very probably, it was their formation which initiated the slow break up of the

* Unique forms like *Aegeria aerifrons* prove the former continuity of Corsica and South France.

Mediterranean continent, resulting first in the isolation of the Balearic Islands, then of Corsica, followed by the crumbling away of the lands uniting Malta, Sicily and Greece, culminating in early Pleistocene times in the steady wash of the Aegean Sea into the Black Sea and the consequent separation of *Z. flabellaria* on all of the many islands it now holds.

Probably, the last to be cut off thus was Cyprus, which remained connected to Asia Minor far into the Pleistocene Age.

IX.—THE GENUS MEGABISTON (LEECH).

Megabiston plumosaria (Leech). Distribution :—Japan, Ussuri District.

Megabiston plumosaria, although veritably a genuine member of the Bistoninæ, presents superficially a most curious compromise between species of the *Boarmia consonaria* group and the two *Lyciae*, *L. hirtaria* and *L. ursaria*. Irrespective of this, in structure, it combines the characters of *Lycia*, *Amphidasys* and *Biston*.

In its two pairs of posterior tibial spurs and the armature of the male vesica, it makes a close approach to earlier Amphidasyd forms, whilst in the furca and other points of contact of *Amphidasys* and *Biston*, it resembles both ; and the whole is crowned and toned down by a multiplicity of minor and unobtrusive points reminiscent of *Lycia*. These latter marshalled in line and totalled up reveal that its leaning is on the whole toward this last genus. In a few words, the whole meaning of this melangé of relationships is that it is a transition form exhibiting to the enquiring mind what the Non-Boarmioid Bistons looked like immediately after their evolution from the Boarmioid main stem. From it, undoubtedly, *Lycia*, and therefore its linked up genera, have been built and in a significant way, its status as a pioneer species of future apterous groups is stamped on it by its huge feathered antennæ.

We are thus left with no other conclusion possible than that *Megabiston* bears somewhat the same relation to *Lycia* as *Nyssiodes* does to *Poecilopsis* and *Nyssia*, and this judgment is confirmed most curiously by the similarity in distribution between *Lycia*, *Poecilopsis*, and *Nyssia* on the one hand and between *Megabiston* and *Nyssiodes* on the other.

Careful study having revealed the history of the peregrinations of *Nyssiodes*, upon that history that of *Megabiston* hangs as on a peg, for it is to all intents and purposes the same and need not therefore be repeated here.

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We have received three special leaflets from the Board of Agriculture and Fisheries, No. 32, dealing with ' War Food Societies ; ' No. 49, ' The Selection of Wheats for Spring Sowing ' and No. 70, ' The Cultivation of Parsnips.'

OROBANCHE RETICULATA, WALLRUTH.

A. BENNETT.

This species (as the *f. procera* Beck), was found in Mid-W. Yorkshire by Mr. H. E. Craven in 1908 near Leeds, and a specimen was sent me by Mr. J. F. Pickard of Leeds. I have now to record it from ' N. E. Yorkshire, 1881, Mr. G. Webster,' sent me by the late Mr. G. Nicholson of Kew, under the name of ' *minor*.' At that date, I had placed it with *O. rubra* Sm., but lately, looking through my specimens, I saw it could not be that species. Unfortunately, there is no exact station, only as I quote. The genus wants carefully examining in Britain, as I feel sure we have other species beyond those recorded. I have a specimen named ' *O. elatior*, Lock Nell, Oban, 1846, ex herb. E. Harvey.' But this lady's specimens were not always to be relied on. It is certainly not *elatior*; it may be *O. cruenta* Bert. (*O. gracilis* Sm.), which occurs on a large number of plants of various orders. I have also three specimens from Sark, Channel Isles, one at least of which is new to our Flora, but they are too far gone over to identify with certainty.

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William Smith: His Maps and Memoirs. By Thomas Sheppard, M.Sc. pp. 75-253 and 17 plates. Price 7/6 net.

If any man can be truly said to have come into his own after much neglect, that man is William Smith. Officially ignored to a great extent, he pursued his steady course, seeing his results published with or without acknowledgement by others, while he, in his own words, was ' left to pursue, unrewarded and alone, the drudgery of more substantial utility ' (1818), until in his old age, the Geological Society of London gave him the Wollaston Medal (1832), the Government a Civil List Pension of £100 (1832), and Dublin an LL.D. in 1835. He died in 1839. John Phillips, his nephew and companion, wrote his life in 1844, and now the generosity of the Yorkshire Geological Society (Proc. Vol. XIX., Pt. 3, March, 1917), has provided for the publication of a complete history of his works and aims, the loving labour of Thomas Sheppard. This extremely interesting memoir gives a sketch of Smith's English predecessors in geological mapping, details bibliographically and critically all Smith's own works, gives extracts from those authors who acknowledged his great services, sketches his life, residences, and memorials, and concludes by reprinting his ' Claims ' (a noteworthy document), and several of his manuscripts. It is a memoir worthy of its subject, and a lasting tribute to a great man. Excellently produced, with numerous facsimiles of maps, sections, portraits and title pages, it reflects the highest credit on its author, and those who preside over the Yorkshire Geological Society.—C.D.S.

1917 May 1.

NOTES ON HELIX (ACANTHINULA) HARPA, SAY, AND ITS DISTRIBUTION.

HANS SCHLESCH,
Hellerup, Denmark.

1824 *Helix harpa* Say. Longs: Exp. VI., p. 256.
1844 *Pupa costulata* Mighels. Proc. Boston. Soc. Nat. Hist. I., p. 187.
1847 *Bulimus harpa* Pfeiffer. Zeitschr. f. Mal., p. 147.
1856 *Helix aculeata* Müller. Nordenskiöld och Nyelander: Finlands Moll., p. 13.
1859 *Helix amurensis* Gerstfeldt. Land-und Süsswasser Moll. Sibir u. Amur, p. 13.
1864 *Zoogenetes harpa* Morse. Portl. Soc. Nat. Hist. I., p. 32, t. i., f. 1-12.
1865 *Helix harpa* Say. Westerlund: Sv. Moll., p. 46.
1871 ,, ,, ,, ,, Exposé crit., p. 57.
1871 ,, ,, ,, ,, Faun. Moll. Sv., Norv. et Dan., p. 153.
1882 *Patula* ,, ,, Esmark: Land and Fresh-water Moll. in the Arctic Reg. of Norway, p. 98.
1885 *Helix* ,, ,, Westerlund: Land och Sötvatten-moll. ins. under Vega-Exp.
1887 ,, ,, ,, Clessin: Moll. Fauna Oesterr, Ungarn u. d. Schweiz, p. 793, f. 525.
1889 ,, ,, ,, Westerlund: Fauna palæarc. Reg. leb. Binnenconch, p. 17.
1897 ,, ,, ,, ,, Synop. Moll. ext. Scand., p. 46.
1901 ,, ,, ,, Luther: Land och Sötvattengast. utbred. i. Finland, p. 59.
1908 *Acanthinula harpa* Say. Odhner: Moll. d. Lappl., Hochgels, p. 140.

Testa ovata-turrita, tenuis, virescens vel corneo-lutescens sericina, confertim striatula et distanter membranacco-costulata. Spira elevata, obtusiuscula; anfr. 4-4½, *convexiusculi, ultimus ventrosus, spiram subæquans; sutura profunda, umbilicus profundus, sed angustus; apertura semi-ovalis et rotundato-sublunaris; peristoma simplex, acutum, margine columellari subreflexo* (Westerlund).

Animal oviviviparum marginibus pedis profunde crenulatis (Morse). Diam., 2-2½; alt., 3½-4 mm.

Helix harpa Say, is a typical arctic species, distributed over North America, Asia and Europe, and is remarkable as the largest of the subgenus *Acanthinula*, just as *Pupa hoppii* Möller, from Greenland, is by far the largest *Vertigo*. *Helix harpa*

Say, lives under the decayed foliage of *Betula, Salix* and *Corylus*, often near running waters, but also under moss, stones, in woods of *Abies*, as well as on the hills. It is a very hardy species, able to withstand periods of drought and severe cold. During winter it creeps only a little depth beneath the surface of the ground, the aperture closed by a thin membrane only, and during periods of drought it is found under decayed foliage, etc. It is a very active species, and enters its shell like a *Physa*. With regard to Morse's observations that it is ovivivi-parous, he found that in several specimens examined, some had over four embryos in the ovary, some only two. *Helix harpa* Say., was first found in Maine, U.S.A., by Say., during Lorg's Expedition to Peter's River, and described by him in 1824. Later it was found in several places throughout the Northern U.S.A. and Canada, and by Dr. Krause in Alaska, in 1882.

Helix (Acanthinula) harpa.

In Sweden, it was first found by Prof. Bohemann, 1843, near Råbäcken in Luleå Lappmark (67° N. lat.) and later by him in the Lyksele Lappmark. In 1870, E. Hemberg observed it common near lakes Storafvan, Nddjaur and Hornafvan, and especially near Arjeploug in the Piteå Lappmark (c. 66° N. lat.).

Further, Säkokhütte and Vastenjaure in Sarek Mountains, 1906 (Odhner), near Hvitvattenskrogen, in Jemtland (Weves), Funnäsdal and Rösvålen in Herjedalen (Söderlund), Säthersdal in Dalarne (C. G. Anderson), Gefle in Gestrickland (Hj. Theel) and Lindbo in Westmannland (C. H. Johansen), Östra Stäcket, Verundö (O. Sandahl, 1883), Lidingö (P. de Laval) and Bellevue (V. Lundberg) near Stockholm.

In Norway it was first recorded from Horgheim, in Romsdal, 14th August, 1858, by Prof. Lilljeborg, and from Skovlökken, near Veiensten, in Geisdal, by C. M. Poulsen. In July, 1882, the Curator (Sparre Schneider) of the Tromsö Museum, found two dead specimens at Kirkenæs, in South Varanger, and it was noticed at Elevenæs in the same area, by H. Nordquist. *Helix harpa* Say. is probably spread over the whole country, but more common in the north.

In Finland it is very common along the Arctic Ocean, but it is scarcer southwards, and is not found in the southernmost parts, although E. Nylander reports it from the 110 metres high Kasberget (Jomala) in Åland Isles (cf. its occurrence at Stockholm). Luther cites the following localities* (except

* Land-och Sötvattengastropodernas Utbredning, i Finland, Helsingfors, 1901, pp. 59-61.

the finds made by my friend, Onni Sorsakoski) :—Common along the shore of Luttojoki (B. Poppius), Outakoski fjell in Utsjoki (H. Nordquist), Patsjoki and Tscharminjarga by Poppius ; Anarjoki ; between Tschkarajoki and Kuoppaniva ; Kusräka and Olenitsa, in the Kola peninsula, by K. M. Levander ; Lake Enare, by E. Nylander ; Kalkkuoaivi, Peldoaivi, and Ketola, near Nuortijärvi (B. Poppius) ; Kantalaks (J. Sahlberg) ; Kemi-Träsk, by E. Nylander ; Tuntsa, near Kuolajärvi ; Alaperä, near Kitinen, in Sodankylä ; between Kultala and Rovanen ; Enontekis, near Käkkälänjokis outlet, in Ounasjokis, by H. Nordquist ; Kuusamo (Holmberg) ; Ruthinansalmi, Suomussalmi and Kuhmoniemi (Onni Sorsakoski) ; Uleåborg, Kiiminki and Kalkkimaa (near Torneå), by Mela ; Solovetsk (K. M. Levander) ; Vigsjön (Mela) ; Jacobstad and Jalguba (J. Sahlberg) ; Kuusaranda and Schungu (B. Poppius) ; Koli, near Pielisjärvi and Linnunniemi near Joensuu (W. Axelson) ; Hirvilaks (Mela) ; Kuopio (K. M. Levander) ; Karstula and Uddegård, in Jyväskyla (Gadolin) ; Konginkangas, Viitasaari and Vasa (A. Luther) ; Pälkjärvi, near Lake Ladoga (H. Backmann) ; Luukala, by Willmanstrand and Pekkala, near Ruovesi, by J. Sahlberg.

The occurrence of *Helix harpa* Say. at Astrabad, in Transcaucasia and on Riffelalp, in Switzerland, at an altitude of 2,100 metres, is interesting, and must be a survival from the glacial period (cf., the occurrence of *Pupa arctica* Wallenberg, in Tyrol, Riesengebirge, Tatra* and Switzerland†). As already remarked, it is, as far as I know, not yet reported from Russia‡ and Siberia, but in 1859, was recorded by Gerstfeldt as *Helix amurensis* from Amur. According to Westerlund, it was found by the Vega Expedition in Konjambay (65° N.) in the Chukchees peninsula, 28-30th July, 1879, and Bering Island§ on 15-19th Aug., of the same year.

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Mr. T. Sheppard, M.Sc., has been elected honorary life member of the Selby Scientific Society.

A correspondent writes :—'I endorse all your remarks on publications on page 82. I wonder how many of our Libraries in the six northern counties have even a few volumes of *The Naturalist* on their shelves, yet every year it contains valuable matter relating to every area covered. Our Libraries don't receive the attention they ought. The question of education is constantly forward, yet to educate a lad well, and then not have a good library to his hand, is like giving the key of an *empty* cupboard to a hungry lad. Perhaps some of my fellow readers may not preserve their *Naturalists*. They might do worse than have them bound up at the year end, and present them to some Library where somebody would appreciate them.'

* *The Naturalist*, 1914, p. 243.
† *The Naturalist*, 1916, p. 61.
‡ Except its occurrence at Peterhof (Lindholm).
§ 54° 40'-55° 25' N. Alt., 165° 40'—166° 40' east of Greenwich.

MALACOLOGICAL FAUNA OF HALLDORSSTÖDUM, NORTH ICELAND.

HANS SCHLESCH.
Hellerup, Denmark.

Mr. Francis Pállsson from Halldorsstödum in Laxárdal, Sudur Thingeyarsyssel in N. Iceland, sent me a small box of shells, which Mr. John W. Taylor, M.Sc. had the kindness to verify my determinations. The box contained the following species :—

Vitrina (*Phenacolimax*) *angelicæ* Beck.
(Syn : *V. pellucida* Müller).
Agriolimax agrestis Linné.
Arion subfuscus Draparnaud.
Limnæa peregra var. *ovata* Draparnaud.
,, *truncatula* Müller.
Pisidium subtruncatum Malm.

The specimens are included in my collections in the Hull Museum.

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LIST OF ICELAND LAND AND FRESH WATER MOLLUSCA.

HANS SCHLESCH,
Hellerup, Denmark.

† Recorded. * Supposed distribution.

NAME.	W.	N.	E.	S.
Limax arborum Bouchard-Chantereaux	†	†	*	†
,, ,, var. *alpestris* Lesson and Pollonera	†			
Agriolimax agrestis Linné	†	†	*	†
,, *reticulata* Müller	†	*	*	*
,, *laevis* Müll., var. *hyperborea* Westerlund	?			
Vitrina pellucida Müller	†	*	†	†
Euconulus fulvus Müller	†	†	†	*
Hyalinia alliaria Müller	†	*	*	†
,, *radiatula* Alder	†	†	*	†
Arion ater Linne	†		†	†
,, ,, var. *atra* Linné	†			
,, ,, var. *nigrescens* Moquin-Tandon	†			
,, *subfuscus* Draparnaud	†		*	†
,, ,, var. *aurantiaca* Locard	†			
,, var. *fuliginea* Morelet	†			
,, *hortensis* Férussac	†		*	*
Helicogona arbustorum Linné	†	*	†	*
,, ,, var. *alpestris* L. Pfeiffer	†		†	
,, ,, var. *hypnicola* Mabille			?	
,, ,, var. *trochoidalis* Roffiaen	†			
Cepaea hortensis Müller	†		†	†
,, ,, var. *roseolabiata* Taylor				†
,, ,, var. *ludoviciana* d'Aumont				?

NAME.	W.	N.	E.	S.
Pupilla muscorum Linné var. *lundströmi* Westerlund ..	?			
Vertigo arctica Wallenberg	†	*	*	*
Cochlicopa lubrica Müller	†	†	*	†
Succinea groenlandica Beck	†	†	*	†
,, *altaica* var Mart., var. *norvegica* Westerlund ..	?			
Radix pereger Müller	†	†	*	†
,, ,, var. *geisericola* Beck	†	†	*	†
,, ,, ,, *albina*	†			
,, ,, ,, *ovata* Draparnand	†	*	†	†
,, ,, ,, *steenstrupi* Clessin	†			
,, ,, ,, *fontinalis* Studer	†	†	*	*
,, ,, ,, *piniana* Hasay	†	†	*	*
,, ,, ,, *microcephala* Küster	*	†	*	*
,, ,, ,, *sikesi* Preston	†			
,, ,, ,, *lacustrina* Clessin	†			
Limnophysa truncatula Müller	†	†	*	†
,, ,, *spira gracilis* Mörch	†			†
Gyrorbis leucostoma Mill.	†			
,, *spirorbis* Linné	†			
Gyraulus glaber Jeffreys	?			
,, *arcticus* Beck		†		
Pisidium amnicum Müller	*	†	*	*
,, *pulchellum* Jenyns	†			
,, *nitidum* Jenyns	†			
,, ,, var. *fedderseni* Westerlund	?			
,, *subtruncatum* Malm	*	†	*	*
,, *lilljeborgi* Clessin	†	*	*	†
,, *scholtzi* Clessin	†			
,, *pusillum* Gmelin	†			
,, *casertanum* Bourguignat	†			
,, *personatum* Malm	†			
,, *milium* Held	†			
,, *fossarinum* Clessin	†	†	*	*
,, ,, var. *flavescens* Clessin	†			
,, *obtusale* C. Pfeiffer	†	*	*	†
,, *steenbuchi* Möller	*	†	*	†
Margaritana margaritifera Linné	?			

——: o :——

Mr. A. E. Gibbs, the well-known entomologist, has died.

We regret to notice the death of Mr. Edward Hewitt, who for fourteen years has been curator of the Museum at Stockport.

We learn from the daily press that 'Dr. F. A. Bather, of the British Museum, advises the collection of local printed matter, posters, bills and notices. Historians, he says, may write what they like about the Kaiser and Hindenburg and Lloyd George, but the great demand would always be for an account of what happened to the ordinary man and what he was doing at the time.'

When *Punch* indulges in natural history, he is amusing, if not pathetic. The following is his latest:—'One of the rarest of British birds, the Great Bittern, is reported to have been seen in the Eastern counties during the recent cold spell. In answer to a telephonic enquiry on the matter, Mr. Pocock, of the Zoological Gardens, was heard to murmur: "Once bittern, twice shy."' From what we know of Mr. Pocock, we are inclined to think that he murmured it was a Great Auks.

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Mr. J. T. Marshall gives Additions to 'British Conchology,' and Prof. A. E. Boycott has a Preliminary Note on the Geneta'ia of *Acanthinula lamellata* Jeff., in *The Journal of Conchology* for April.

Wild Life for February contains the following interesting notes:—'The Peregrine Falcon at Home,' by J. Atkinson; 'The Click Beetle or Skipjack,' by O. Warner; 'Notes on the Reed Warbler,' by J. H. Murray and A. M. C. Nicholl; 'Notes on the Fallow Deer,' by J. K. Emsley; 'On the Protection of Birds,' by P. B. Mitford; 'Notes on the Spoonbill,' by G. S. Felton, and 'A Sea-Mews' Darien,' by A. Macdonald.

In *The Entomologist's Monthly Magazine* for March, Dr. R. C. L. Perkins concludes his account of the Kirby Collection of Sphecodes, etc. He gives particulars of a dozen changes of names which will have to be made in our lists: we give the first and last, from which it will be seen that these are rather drastic:—*Melitta monilicornis* K. = *Sphecodes subquadratus* Sm.; and *Andrena leucophthalma* K. = *Nomada borealis* Nyl. Mr. H. Britten writes on '*Meolica exiliformis* Joy, a good species', and Mr. J. B. Walsh 'On the rarity and restricted distribution of animal—especially insect—species.'

NEWS FROM THE MAGAZINES, etc.

Knowledge and *The Quarry* will appear quarterly, instead of monthly, for the future.

The Belfast Museum Publication No. 59, is devoted to 'Weeds, and How to Combat Them,' by the Curator, Mr. A. Deane.

Mr. A. Chapman writes on Brent Geese, and Mr. W. Denison Roebuck on the Mollusca of Elgin, in *The Scottish Naturalist* for April.

Prof. G. H. Carpenter's Presidential address to the Dublin Naturalists' Field Club, on 'Useful Studies for Field Naturalists,' is printed in *The Irish Naturalist* for April (pp. 66-70).

The natural history collections at the University College, Nottingham, are to be transferred to Burwell Hall, which is some distance away. We trust that Prof. Carr, who has done so much for this Museum, will still be able to keep a watchful eye upon it.

Among the papers in *The Entomologist* for April are 'A New Geometrid Moth,' by Rev. J. W. Metcalfe; 'New and Little Known British Aphides,' (referred to as 'Britishaphides'), by F. V. Theobald; 'British Plant Galls,' by H. J. Burkill; 'British Neuroptera in 1916,' by W. J. Lucas.

In *The Entomologist's Monthly Magazine* for April, Mr. W. E. Sharp writes on *Cryptocephalus bipunctatus* L., and *C. biguttatus* Scop. (=*bipustulatus* F.); and Mr. G. T. Porritt describes a new variety of *Abraxas grossulariata*, bred at Huddersfield by Mr. J. Lee, to which the name *albovarleyata* is given.

Punch draws the attention of Biologists to the fact that a recent writer in the *Daily Mail* refers to a certain octopus having antennæ. Presumably the point is there *antennæ*. Personally, we don't think that biologists would consult either *Punch* or the *Daily Mail* as to the precise histological significance of the sessile-suckered tentacles in the larger cephalopoda.

The Vasculum for February contains the following items:—'Mice, Voles and Shrews,' by George Bolam; 'Some Beasts of Barn and Byre,' by J. E. Hull; 'Concerning Grebes,' by A. Chapman; 'Talks about Plant Galls,' by Richard S. Bagnall and J. W. Heslop Harrison; 'A New British Midge-Gall from County Durham,' by Harry Stewart; 'Newham Bog,' by J. E. Hull; among others.

We regret to see the announcement of the death of the Rev. O. Pickard-Cambridge, M.A., F.R.S., who was born in 1828. He frequently wrote on entomological subjects, and had a world-wide reputation as an authority on Arachnida, his 'Spiders of Dorset' being a classic. He also contributed a fine article on Arachnida to the 'Encyclopædia Britannica' (9th ed.). He frequently helped Yorkshire naturalists in their work among the spiders, as the pages of *The Naturalist* testify.

We notice that the caretaker at the offices of a large Railway Company at Hull was recently summoned in respect of a light which was visible all night. The defence was that the rats had evidently run over the lever and turned the gas on. It is not stated whether the rats struck a match and applied it to the gas jet. We know rats are very accommodating at Hull. Even specimens of the old English black rat occasionally walk into the traps which are set for them in the garden at one of the museums there.

The largest haul of coarse fish ever made in the River Eden has been made by Inspector Whyte in the Kingarth Water. He had noticed a large collection of fish below the ice covering a pool, and with the assistance of two other water bailiffs he managed to get a net round them below the ice, and when the net was hauled in about 8,000 fish, chiefly chub and dace, which weighed over a ton, were caught. Most of the fish were in spawn. The largest number taken previously in one draft from the Eden was about 1,300.

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NOTES AND COMMENTS.

REV. O. PICKARD CAMBRIDGE.

Mr. Wm. Falconer writes: 'Of commanding height (standing well over six feet) and genial presence, the Rev. O. Pickard Cambridge, whose death was briefly recorded in our last issue (p. 176), was a familiar figure in Dorset, having been rector of Bloxworth for 49 years. His interest in spiders began so long ago as the days of Westwood, Blackwall and

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Meade. In the course of his long and eminent services to British Arachnology, he originally named and described nearly one quarter of the species on the now corrected British list, and by corresponding and exchanging specimens with foreign naturalists established the identity of such of our spiders as were known on the Continent under other names, and at the same time ascertained their correct nomenclature. Latterly, owing to his advanced age, he had been unable to do any outdoor work, but continued his annual reports on the Arachnida, the last published in 1914 giving ample proof of unabated mental vigour. His collection, the most complete as regards British species, is bequeathed to the Hope Museum, Oxford University, his Alma Mater.'

WEIRD WINDS.

In a note on 'The Means of Plant Dispersal:—Storm Columns," in *The Selborne Magazine* for April, the Rev. E. A. Woodruffe Peacock states:—'On July 28th, 1908, there was another fall of outside material at Cadney, which by singular good luck was fully observed. I was sitting writing at my study table in the window, and as I looked up from my paper detected the grasses slowly falling from a cloudless sky. I seized the field-glasses and ran out to observe all that I could make out. This shower had been on for fully five minutes before I detected it, and lasted for about another ten minutes afterwards, judging solely by the material on the ground when I first ran out and the after-addition made to it. Standing on the footpath in the middle of the Vicarage garden, the falling grasses seemed to be about three feet apart. The smoke was going straight up from the chimneys round, and so far as I could detect there was not a breath of moving air. The fall was quite perpendicular and very gradual, but with what I may call a good deal of side-slip in some of the specimens. I put the marine sight on the field glasses and ranged the zenith. What distance these binoculars would carry upwards I cannot say, but as far as I could range with them with there was falling material coming from a point beyond my aided vision. On an average every fragment of a plant or perfect specimen was about a yard from the next at first, and from twenty to twenty-five feet when the fall was about over.'

THE VASCULUM.

The Vasculum for March contains some notes on 'The Vegetation of Sea-Sand,' by Mr. H. Jeffreys; the Rev. J. E. Hull has an interesting paper on 'Natural Features in local Place-names;' Mr. J. W. H. Harrison writes on 'Sallowing;' Mr. J. S. T. Watson on 'The Nightjar' and Mr. C. E. Robson reports on the Field Meetings. Mr. G. B. Walsh gives an account of 'The Entomologist's Bookshelf,' in which many works of varying worth receive a cheap advertisement. We doubt, however, whether any ordinary human entomologist has such a book-shelf. Mr. T. A. Lofthouse contributes 'A few Entomological Notes from Upper Teesdale,' and there are the usual valuable 'Notes and Records.' We eagerly looked to two important items named in the 'Contents,' but they proved to be notices of papers in the *Journal of the Quekett Club* and *The Naturalist* respectively.

A COALFIELD IN THE FENLAND.

We notice in the discussion of a paper on 'The Effects of Earth Movement in the Sheffield District, etc. (*Trans. Inst. Mining. Eng.*), Prof. Kendall referred to 'a very small-scale map that he had ventured to put before the Royal Commission

on Coal Supplies, embodying his views as to the probable (or possible) extension of the concealed coalfield. That portion of the map which was extended in a south-easterly direction into the Fen country, was rather severely criticised by members of the Geological Survey at the time, and a member of the Royal Commission attached to it a name which, he was sorry to say, still lingered in the minds of members of the Commission, and was occasionally quoted—namely, " Kendall's preposterous belly.' That extension of the coalfield was, he thought, considerably sustained and justified by the work that Prof. Fearnsides had done.' It is a remarkable fact that, of the three hypothetical boundaries of the hidden coalfield suggested by Professor Kendall, this, upon the south-east, which came in for the most criticism, is the one most strongly sustained by subsequent research.

THE SUPPLY OF IRON ORE.

At the Royal Society of Arts recently, Professor W. G. Fearnsides of Sheffield, dealing with the available home supply of iron ore, said that of the 29 counties working ore, Yorkshire (Cleveland) got nearly 5,000,000 tons in 1915, from which 1,446,413 tons of pig iron were obtained. Northampton, Lincoln and Cumberland were next in order, the last-mentioned county turning our by far the best value. The total output in pig iron for 1915 was 4,567,351 tons. Germany had increased her output of pig iron from 9,000,000 tons to 19,000,000 in ten years, and our own output had not increased in ratio. The hematitic belt extended in England from Cleveland to Banbury, but there were immense beds of a low grade ore in this country which contained a good deal of phosphorus, and, therefore, not so good in the furnace. Germany's great superiority in output was due to the realisation of just such quality ore, and if our metallurgists were to exploit our own supply to such a good purpose as steel-making, he thought it would be found there was no national shortage or iron ore whatever.

GEOLOGICAL PHOTOGRAPHS.

Prof. W. W. Watts favours us with a copy of the Eighteenth Report of the Committee on Photographs of Geological Interest, presented at the Newcastle meeting of the British Association.* From this we learn that ' Mr. Bingley adds still further to his photographic survey of the Yorkshire coast, as well as sending sets from the Yorkshire Dales, from Settle and from Leeds. He also contributes a carefully selected set from the Magnesian Limestone of the Durham coast. To him we owe prints from Cumberland, Westmorland, Lancashire, and the

* The seventeenth report was presented at the Sheffield meeting in 1910.

Isle of Man.' Mr. Godfrey Bingley's contribution consists of 207 prints, including some from Cornwall. We notice the Carnarvonshire views were photographed by . . . 'L'—we daren't even make a guess who it is ! There are now 5,656 photographs belonging to this committee, the northern counties being represented by Cumberland 45, Derbyshire, 69, Durham 210, Lancashire 86, Westmorland 93, Isle of Man 109, Yorkshire 1,087 !

THE SCARBOROUGH BRONZE AXES.

The hoard of bronze axes described in these pages for May has given rise to some discussion in the press. Mr. A. V. Machin, J.P., writing to the *Yorkshire Post*, says (after some really kind and complimentary remarks about the Hull Museum, which we omit) :—'I should much like to know how it is that these interesting relics were not secured for the Scarborough Museum. Personally I would like to see the "finds" of each locality housed in the principal place of the neighbourhood, even in a place of the size of Filey, where so many interesting things have been found in the past 25 years. Some years ago I ventured to ask the Filey Urban Council if they could not set apart a room or do something to keep local "finds" together, but the Council could not see its way to do anything. I know there was then a prominent inhabitant who was willing to give of his treasures. Since those days the Rev. W. H. Oxley has opened a small private museum which may be seen on payment of a small fee, which goes towards a local charity. I fear a good many very interesting "finds" have left the neighbourhood for ever, instead of being kept in local museums to remain objects of interest to visitors and, what is more important, to be of educational value for this and future rising generations. I feel sure if duplicates were found in any locality and were secured for the local museum, Mr. Sheppard would probably be glad to negotiate for exchanging objects of antiquarian value, and so the local museums, say, at Scarborough, Filey, and Bridlington, etc., would benefit as well as the excellent Municipal Museum at Hull.'

YORKSHIRE ANTIQUITIES.

To this, as might be expected, Mr. Sheppard replied: 'I should like to say at once I heartily agree with Mr. Machin that the best place for a find of antiquities is the nearest museum, but it is necessary that the nearest museum should be a permanent institution. I believe I am correct in saying that the Scarborough Museum, that at Whitby, and even those at York and Leeds are in the hands of private Societies, and while there is every reason to hope and believe that some day they may be permanently in the possession of the respective towns or cities, there is just a possible chance that they may not. Even

the Driffield Museum, which contained a finer collection of Yorkshire pre-historic remains than all these museums put together, might easily have been lost to the county, if not to the country, were it not for the generosity of Colonel G. H. Clarke, who purchased it and presented it to the people of Hull. Even the Hull Museum itself (that is the first one we had) was at one time in private hands, but through the admirable arrangement made between the Literary and Philosophical Society and the Corporation, is now public property. When that grand day arrives that each of our Yorkshire museums becomes public property and its permanency is assured, doubtless some such exchange as Mr. Machin suggests can be made. I know of many specimens in most of the museums mentioned which, in my opinion, should be in Hull.'

LANCASHIRE AND CHESHIRE EMTOMOLOGISTS.

At a recent meeting of the Lancashire and Cheshire Entomological Society, a discussion and exhibition of ' Backyard Insects,' to which most of the members contributed, was the leading feature of the meeting. Mr. West contributed the following Diptera from St. Helens, viz. :—*Chrysis ignata*, *C. rubii*, *Thereva nobilata*, the silver-tail fly ; *Leptis scolopacea*, *L. lineola*, *Sarcophaga carnaria*, and several species of Dolichopodidæ. Mr. F. N. Pierce exhibited *Blastotere glabratella* Zell., an argyresthid moth belonging to the *illuminatella* group, captured near Repton, Derbyshire, by Mr. C. H. Hayward. The species was introduced to the British list by Lord Walsingham in 1906 from specimens taken in Norfolk, and it has since been captured near Kings Lynn by Mr. Atmore ; the Derbyshire record therefore seems to indicate that it is spreading in Britain. Mr. Pierce also exhibited a series of drawings of the male genitalia of the Palæarctic Psychidæ executed by the Rev. C. R. N. Burrows from his own recent preparations. Mr. W. Mansbridge showed a series of *Scoparia ambigualis* and its melanic variations from the West Riding and East Lancashire. Mr. Mansbridge also read a paper describing the work and methods of the Lancashire and Cheshire Fauna Committee. Mr. F. N. Pierce showed series of *Catoptria æmulana*, *C. tripoliana*, and from the late S. Stevens' collection, a series of reputed *C. decolorana* ; also a supposed specimen of *Eupœcilia manniana* which, from an examination of the genitalia, he had found to be a dwarfed *Argyrolepia cnicana*. Mr. S. P. Doudney had a long series of *Porthesia similis* from wild larvæ taken on the same hedgerow at Huyton, near Liverpool, in which many of the females had the tail-tufts brown instead of yellow, except for a slight admixture of yellow hairs ; all the males were normal.

ACLISINA.

At a recent meeting of the Geological Society of London, Mrs. Longstaff read a paper on *Aclisina* and *Aclisoides*, with descriptions of six new species. The diagnoses of these were given, and a species named by Mr. H. Bolton *Loxonema ashtonensis* is referred to this genus, as several specimens show the characteristic lines of growth. The total number of species of *Aclisina* is now brought up to twenty-two, and there are besides several varieties. A small variety of *Aclisina pulchra* De Koninck appears to have continued for the greatest length of time, commencing in the Calciferous Sandstone Series, existing throughout the Lower and Upper Limestone Series and on into the Millstone Grit of Scotland. Additional observations are also made on *Aclisoides striatula* De Koninck, showing its variation in size and ornamentation, as well as its range throughout the Lower and Upper Carboniferous Series of Scotland, its occurrence at Settle and Poolvash, and at Tournai as well as Visé.

MICROSCOPIC MATERIAL OF THE BUNTER.

At the same meeting, Mr. T. H. Burton read a paper on 'The Microscopic Material of the Bunter Pebble-Beds of Nottinghamshire and its Probable Source of Origin.' As shown by the distribution of the heavy minerals, combined with (*a*) the direction of the dip in the cross-bedding, (*b*) the evidence adduced by boreholes and shaft-sinkings, a main current from the west is indicated. In the neighbourhood of Gorsethorpe this current bifurcated, one division flowing eastwards, the other running south-eastwards. A large quantity of the material is derived from metamorphic areas, as shown by the presence of staurolite, shimmer-aggregates, microcline, sillimanite, and kyanite. The source of the bulk of the material is probably Scotland, and the westward adjoining the vanished land, from rocks similar in the main to those of the metamorphic and Torridonian areas known in that country. Minor supplies came from the neighbouring Pennine ridge, and from other surrounding tracts of high land. The material was transmitted by means of a north-western river and its tributaries, flowing into the Northern Bunter Basin. During certain flood periods this river overflowed across Derbyshire, carrying its load of sediment, much of which was deposited, as it is now found, in the Pebble-Beds of Nottinghamshire.

A NEW RUSSIAN MAGAZINE.

As we have recently recorded the decease of a number of British scientific journals, it is with some satisfaction to record a new Russian scientific journal, the *Revue Zoologique Russe*, edited by A. N. Sewertzoff and W. S. Elpatiewsky, the English agents for which are Messrs. Witherby & Co. The articles

are in Russian, French and English ; most of them apparently in both Russian and French. Among the papers are ' Les spermatozoïdes de l'Isodactyle ' ; ' Le système nerveux du somite chez *Pontobdella muricata* L ' ; ' The Removal and Transplantation of the Auditory Vesicle of the Embryo of Bufo (the correlation at the formation of the cartilaginous skeleton).' There is also a Bibliography of current literature. There are plates and other illustrations.

LEEDS CONCHOLOGISTS AND THE WAR.

Of the Leeds Conchological Club, which consists of about a score of members, three are, or have been, in the Army on active service or in training—Private Walter Withell, Leeds, 15th Battalion West Yorkshire Regiment, was wounded and disabled on the first day of the Battle of the Somme, when he was in the leading company of the leading battalion of his division. Has collected shells in Egypt and at Serre, in France, as well as in camp in Wiltshire, and in hospital at Dorchester after his war services. Second Lieutenant C. Theodore Cribb, of Shipley, was in the Army Service Corps as Andriencq in the Dep. Pas de Calais ; made large collections of the shells of that district. His list will appear in the *Journal of Conchology* and will be a notable contribution to the malacology of France. He is now in Sussex, training for the Royal Field Artillery, is using his spare moments in working at Sussex mollusca, and has already sent an addition to the recorded fauna.

IRISH SHELLS.

Signaller Ernest Stainton, B.Sc., of Doncaster, of the 2nd Sixth Battalion Scottish Rifles, is in training at Kilworth Camp, near Fermoy, County Cork. He is at present utilizing his spare time to great advantage, investigating the mollusca of the Fermoy district, and has already sent a large number to Mr. W. Denison Roebuck for record, who will probably draw up and publish a report of his work for *The Irish Naturalist*. This is not a bad record for a little society, when all its service members do good work and utilize the scanty opportunities they have.

MOSQUITOES, BUGS AND SPIDERS.

The British Museum (Natural History) has recently issued three of its ' Economic Series ' of publications, which are especially valuable at the present time. One, dealing with ' Mosquitoes and their Relation to Disease : their Life History, Habits and Control,' is by F. W. Edwards. Another, by B. F. Cummings, refers to ' The Bed-Bug : its Habits and Life-History and how to deal with it.' Like the preceding, this is sold at one penny. A more substantial pamphlet describes ' Species of Arachnida and Myriopoda (Scorpions,

Spiders, Mites, Ticks and Centipedes) Injurious to Man,' and is by S. Hirst (60 pp., 6d.). All three are well illustrated, the last having twenty-six text figures and three plates. The British Museum is certainly doing good work in publishing these useful monographs so cheaply.

KING OF FISHERS.

O ! blue bird of Yore, 'mid its sallows galore,
What time the bare wythes are whip wandy ;
A rainbow you make as wet diamonds you shake
From the penns that endue you a dandy ;
But if only you knew, as flash ! by me you flew,
What thoughts you inspire—yet, No,
You act on a need all amoral, no meed
Save exist and subsist—be it so.
A minnow's live inch you spear on the lynch,
Of a bank, or weir's bollard green-moss'd ;
Your cravings so say it, and straightway you slay it—
Your daring the rubicon crossed ;
For nature recks naught of a human law taught ;
As with your gaunt fere the grue heron.
Nor Reason may spean from its trick of rapine,
Its purpose a new brood to spur on.
We, therefore, condone, since " for each scale its bone ; "
Low, food for the Higher, by venvil, not grace,
So, Kingfisher, you ; the true " Bolt from the blue "—
Thy cache of globes glossy, hatched, plead well your case.

April 14th, 1917. F. Arnold Lees.*

——: o :——

We learn from the press that at the Annual Meeting of the Zoological Society recently, it was stated that the total number of animals had been very greatly reduced, partly because the large animals that had died during the war had not been replaced, and partly because many animals which could be replaced in normal times had been destroyed. There was a corresponding reduction in the consumption of food, and the principle had been adopted of using only food unsuitale for human consumption. At least six of the penguins have recently died as a result, it is said, of the abnormally damp and protracted winter.

It has remained for an American weekly paper to distinguish the difference between birds and birds. It was like this : A young woman entered a bookshop in Chicago and asked the help of the clerk in selecting suitable reading. She especially desired some native American fiction, she said. " Why not try Allen's ' Kentucky Cardinal ' ? " said the salesman, taking a copy of the book off the shelf. " That's a very popular book." " No ; I don't think I care for those theological stories," said the lady. " But this cardinal was a bird ! " " I am not interested in the scandals of his private life," replied the young woman, and out she walked.

* In *The Yorkshire Post.*

ECONOMIC MYCOLOGY: THE BENEFICIAL AND INJURIOUS INFLUENCES OF FUNGI.*

W. N. CHEESMAN, J.P., F.L.S.

We meet for the third time under the cloud of a great European War, the most terrible war the world has ever seen. Let us hope that when the successful end is accomplished, and the silver lining comes into sight, means will be adopted to prevent the repetition of such a world's calamity.

May nations in the future strive only to excel in the peaceful arts and sciences, and in the production of things which may tend to the happiness and betterment of mankind.

Already the attitude of the public mind towards science in relation to commerce and industry is hopeful and encouraging.

Although Mr. Crossland, in his Presidential Address in 1908, acknowledged the part taken by the early workers in Mycology, I feel that no reference should be made to Yorkshire Mycology without expressing deep appreciation of the great help rendered to the workers by Mr. George Massee, for many years the head of the Cryptogamic Department in the Royal Herbarium at Kew, and who for forty years has been the mainstay of the section in our county.†

Others who have rendered yeoman service in their time, and who have passed away may be mentioned: The Revd. Canon Fowler, Dr. Franklin Parsons, R. H. Philip, H. T. Soppitt and William West.

All honour and appreciation is due to our esteemed veteran and past President of the Union, the late Charles Crossland, who for many years laboured most assiduously and successfully in the Mycological work of the county. We have still with us energetic workers in the persons of Dr. Harold Wager (Chairman of the Mycological section), Alfred Clarke, Thomas Gibbs, Sir Henry Hawley and others, all of whom are doing useful work in their different departments.

To define a group of plants of such varying characters as the Fungi is not an easy matter. The number of species is computed to be over seventy thousand, the forms, sizes and colours of which range over an enormous extent. Perhaps the most concise definition is ' Cryptogams minus chlorophyll,' meaning that they belong to one of the lowest groups of vegetation, having the reproductive organs hidden or concealed, and that they are devoid of chlorophyll, the green colouring

* Being the Presidential Address to the Yorkshire Naturalists' Union, delivered at Selby on December 2nd, 1916.

† Since the above was written we have had to deplore the loss of both Geo. Massee and Chas. Crossland.

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matter of plants; thus they are unable to elaborate their food from inorganic matter and can only subsist as parasites or saprophytes on organic substances.

The economic value of Fungi is of greater importance to mankind than that of any of the other classes of Cryptogamia, although they are generally supposed to militate for injury rather than for benefit. Certainly in many ways Fungi are injurious to man, but the good services they render balance their occasional devastations. Truly Fungi may be rightly called 'Nature's Refuse Destructors,' for they have the power of reducing to the natural elements the accumulations of non-living vegetable and animal substances, which, but for these powers of operation would soon render many parts of the world untenantable.

The spores of Fungi are so small and light that they float in the air in considerable quantities, and the work of destruction at once commences when the spores alight on material forming a suitable nidus, given the requisite amount of moisture and warmth.

Their power of multiplication is enormous (much greater than that of any other class of organisms), and when their allotted task is accomplished they swiftly disappear after running their life's course, diffusing their spores in the atmosphere ready again for similar destructive work, like the comparison of motor and horse traction, where the former only requires feeding when active service is required, and the latter needing food whether at work or at rest, so the Fungi spring suddenly into existence when their services are required, complete their work of destruction, and then returning to their latent unnoticed state, ready, however, at a moments warning, again to be developed.

Other benefits which mankind derive from Fungi may be mentioned: (i.) Their value as a food supply; (ii.) Their uses in medicine; and (iii.) In the arts of brewing, cheesemaking, tanning, &c.

That the ancients were acquainted with the food value of Fungi is proved by allusions to the same in many of the classical writings. The botanical remains of Theophrastus (d. B.C. 287), contain several references to Boleti (under which name all large fungi went) describing their forms, habitats and qualities. Nicander, the poet-physician, who flourished a century later, in his work on 'Poisons and their Antidotes,' enumerates several species of fungi which were considered to be poisonous, the growth of which he attributes to 'fermentation,' and recommending amongst other remedies a mustard emetic for those who had inadvertently eaten poisonous Fungi.

The 'Materia Medica' of Dioscorides (*circa* A.D. 50)

describes between 500 and 600 plants, chiefly medicinal; in it is the first mention of the word Agaricum, which word has been adopted by modern mycologists for the large group of gilled Fungi of which we have in Britain over a thousand species. Dioscorides says: 'Fungi (μύκρηες) have a twofold difference, for they are either good for food or poisonous,' and indicates one species as being useful for 'imparting a sweet taste to sauces,' also recommending that the edible fungi be cooked in oil and with much honey.

Pliny (b. A.D. 23) tells us in his 'Natural History' much about the preparation of the dishes of Boleti which was one of the luxuries of the wealthy Romans. The Fungi were to be prepared by the epicures themselves with amber knives and silver service, and were never to be trusted in the hands of servants, for he says it would be safer to send silver or gold by a messenger than to trust him with Boleti. 'Argentum atque aurum facile est lænamque togamque mittere: Boletos mittere difficile est.'—Ep. XIII. 48.

The correct description given by Pliny of several of the edible Fungi enables us to recognise some well-known species.

The death of Claudius Cæsar (A.D. 54) by poisoning was attributed to a dish of his favourite Boleti prepared by the Empress Agrippina, but whether the poison was originally in the Fungi or introduced by Agrippina (as Pliny asserts), we are not in a position now to determine, but the case will suffice to show that the eating of Fungi by the wealthy Romans was prevalent, and by them esteemed a luxury, notwithstanding the constant warnings against the possibility of poisoning.

These warnings, which were so frequently given by the ancient writers, might serve as an argument against the use of Fungi as an article of diet, but we must bear in mind the crude state of botanical knowledge, especially in mycology, which the ancients had, and their ignorance of structure, affinities, classification and chemical properties which the mycologists of the twentieth century possess. The number of species of Fungi named and recognised by the ancient botanists would probably not exceed a score and these were the large species considered to be suitable for food. The absence of proper descriptive characters would lead to mistakes being made, often with serious consequences.

It may be of interest to state what a very distinguished Selby botanist wrote three hundred years ago. This Selby born man, Thomas Johnson by name, wrote an amended edition of Gerard's Herbal in 1633, and in the chapter on Fungi, he says:—

'Some mushrumes grow forth of the earth, other upon the bodies of old trees, which differ altogether in kindes. Many wantons that dwell neere the sea, and have fish at will, are

very desirous for change of diet to feed upon the birds of the mountaines; and such as dwell upon the hills or champion grounds do long after sea fish; many that have plenty of both do hunger after the earthy excrescences called Mushromes; whereof some are very venomous and full of poyson, others not so noisome; and neither of them very wholesome meate, wherefore for the avoiding of the venomous quality of the one, and that the other which is less venomous may be discerned from it, I have thought good to set forth their figures with their names and places of growth.' *

'Divers esteeme those for the best which ggrow in medowes and upon mountaines and hilly places, as Horace saith, lib. ser. 2. Satyr 4:

. . . . pratensibus optima fungis.
Natura est, alijs, malè creditur.

The medow Mushroms are in kind the best.
It is ill trusting any of the rest.

Galen affirms that in their Temperature and Virtues, they are very cold and moist, and therefore to approach unto a venomous and muthering facultie, and ingender a clammy, pituitous and cold nutriment if they be eaten. To conclude, few of them are good to be eaten, and most of them do suffocate and strangle the eater. Therefore I give my advice unto those that love such strange and new fangled meates, to beware of licking honey among thornes, least the sweetnesse of the one do not countervaile the sharpnesse and pricking of the other.'

Parkinson divides the group into *Fungi esculenti* (32 sp.) and *Fungi pernitiosi* (32 sp.), finishing with 'Thus have I shewed you all the kindes and sorts of Mushromes, both wholesome and dangerous.'

This was written in 1640, so we may assume that at least sixty-four species of Fungi were then known and recognised.

Carolus Clusius, who was born at Antwerp in 1526, published his book entitled 'Rariorum Plantarum Historia,' in which he gives an appendix on 'Mushromes,' observing that they grew more abundantly in moist weather after thunder. It is left for the present day mycologist to explain the cause of this. Massee thinks that the nitric acid generated in the atmosphere by the thunder is brought down by the rain thus accelerating the growth of fungi. The same cause is given for the curdling of milk and souring of beer in thundery weather.

That thunder exercised some peculiar power in producing

* Gerard's Herbal, 2nd edition, by Thos. Johnson, 1633. With all respect to my fellow townsmen, I venture to think that had he lived in this twentieth century, he would probably be standing before you as the President of the Yorkshire Naturalists' Union, and expressing similar thoughts to those I have the honour of lay before you.

fungi was an opinion current among the ancients, and Plutarch has given us a long and curious dissertation in his 'Symposiacs' (Book IV.) on the question 'Why fungi are thought to be produced by thunder.' At a certain supper in Elis, where large truffles were found, some of extraordinary size were set on the table. Many of the guests seemed to wonder, whereupon some individual jokingly referred to the thunderstorms which had lately happened as being the cause of their appearance, meaning to deride the popular opinion as absurd; whereupon Agemachus, the worthy host prayed the company not to conclude a thing was incredible because it was strange and wonderful. The influence of thunder rains on truffles is referred to by Juvenal, who also speaks of the great estimation in which they were held—

> 'Post hunc tradentur tubera, si ver
> Tunc erit et facient optata tonitrua cænas
> Majores, Tibi habe frumentum, Alledius inquit,
> O Libye; disjunge boves, dum tubera mittas!'
>
> Sat. V., 116-119.

The economic value of Fungi as an article of food is undoubted. During these strenuous times when everyone is advising war economy, it behoves us to look round and see how we can further utilise the 'fruits of the earth' for increasing our food supplies; and it is somewhat sad to see the vast quantities of edible and nutritious fungi which every season are allowed to waste for want of knowledge as to their food value.

They surpass all other vegetable products in the richness of their proteids, and as the percentage of nitrogen is an indication of nutritive value the following examples are quoted of percentages of nitrogen in dried fungi:—

Cantharellus	Boletus	Russula	Lactarius	Agaricus	Morel	Truffle
3·22	4·7	4·27	4·68	7·26	8·23	15·35

In comparison with other vegetable foods the percentages of proteids are:—

Truffle	Morel	Mushroom	Lentil	Peas	Wheat	Rye	Potatoes	Turnips, etc.
35	36·25	26·31	29·33	28·02	16	12	1·5	1·5

Even the poisonous fungi contain much nutritious food material and would be equally valuable if their poisonous elements could be eliminated, some of which are volatile and can be dispersed by high cooking, others are rendered innocuous by the application of vinegar and salt.

A short list of esculent Fungi, nearly all of which have been tested at the Forays of the Mycological Section.

SPRING SPECIES.

Marasmius oreades	Fairy ring champignon.
Tricholoma gambosum	St. George's Mushroom.
Morchella esculenta	Morel.

AUTUMN SPECIES.

Amanita rubescens	Blusher.
Amanitopsis vaginatus	Grisette.
Armillaria mucida	Beech tuft.
Lepiota procera	Parasol.
Tricholoma personatum	Blue-stalk.
T. nudum	Wood blewit.
T. grammopodium	Striped Stalk.
Pleurotus ostreatus	Oyster of the Woods.
Agaricus campestris	Pasture Mushroom.
A. arvensis	Meadow Mushroom.
Coprinus comatus	Shaggy Inkcap.
C. atramentarius	Smooth Inkcap.
Hygrophorus pratensis	Field Apricot.
H. niveus	Snowdrop.
Lactarius deliciosus.	Delicious Red-Milk.
Cantharellus cibarius	Chanterelle.
Boletus edulis	Dainty bolet.
B. scaber	Rough bolet
Fistulina hepatica	Beefsteak.
Hydnum repandum	Wood urchin.
Clavaria vermicularis	White Coral Tufts.
Lycoperdon giganteum	Giant Puff Ball.
Helvella crispa	Brittle Helvel.
Peziza badia	Brown Elf Cup.
P. vesiculosa	Bladder Elf Cup.

The question at once arises: How can this vast supply of food be made available for public use?

There are many ways of doing this which quickly suggest themselves to our minds.

Instruction in schools should be given of some elementary knowledge of Fungi; models and coloured illustrations, like the large wall maps prepared by Worthington Smith and others, might with great advantage be exhibited in schools, and the scholars invited to collect and compare specimens with the models and illustrations, and by periodical exhibitions of named specimens. In the Nature Study Classes, which are formed mainly of the teaching community, there is a great amount of ignorance with regard to the nature of Fungi, especially their edible and poisonous properties and their economic importance generally, some progress is being made, but much more remains to be done to remove this ignorance and prejudice.

It must be borne in mind that there is no golden rule to distinguish the good from the bad, such as the peeling of the cuticle, or testing with silver spoon or golden ring or such like fancies, but the characters of a dozen good eatable species are as soon acquired as those of a dozen flowering plants.

In many of the continental countries Fungi are more used for food than with us in England. They are not only used in the fresh state but are preserved or dried for winter use. Here the only one generally used is the common Mushroom,

but in France and Italy other species are more esteemed, as a visit to the markets testifies. In many places an inspector of Fungi examines and gives certificates for the sale of Fungi brought to the market and condemns that of a doubtful nature.

Ergot of Rye *Claviceps purpurea* (of which I shall later on have to mention as a pest), holds a place in the Materia Medica on account of its active principles and is employed as a vaso-constrictor in uterine hæmorrhage.

The Giant Puffball, *Lycoperdon covista,* is still used in our country places as a styptic. Even a century ago, important surgical operations were performed under its influence as an anodyne and styptic.

The mycelium of *Chlorosplenium aeruginosum* stains wood a rich blue-green colour and the wood thus coloured was much used formerly for many ornamental purposes.

Cheese ripening is due to fermentation caused by bacteria, and the blue mottled colouring and flavour to the mould *Penicillium glaucum* which develops readily in the spaces of unpressed cheese like Stilton, Wensleydale and Gorgonzola, whilst in pressed cheeses of a more homogeneous nature like Cheddar and Cheshire, the spores of the fungus are unable to mature owing to lack of air and oxygen which the intertices of the former cheeses provide.

Brewing and Wine and Cyder making are dependent on Yeast, *Saccharomyces cerevisiæ,* for the conversion of the sugar in the wort into alcohol, emitting during the process CO_2 (carbonic acid gas).

It is found that the terminal rootlets of some plants are are invested with fungus hyphæ forming root caps which do not appear to be detrimental to the host but are in some cases actually necessary to the existence of the plant. This partnership or cohabitation has been termed symbiosis, and the organs performing the symbiosis of root and fungus have been named mycorhiza or fungus-roots which seem to perform the functions of root hairs.

Symbiosis is known to occur in several Orders and Genera of plants, viz., Cupuliferæ, Salicaceæ, Abietineæ, etc., certain of the Orchideæ and some of the Ferns and Lycopods. These fungus-roots are found where much humus exists in the soil and are absent from the roots of plants growing in poor soil with small humus content. The fungus is able to utilise the organic material of the humus and convey it directly in some form to the plant. Although the case is still *sub judice,* it is possible that these fungus-nurses contribute more to the sustenance of the higher plants, including the cereals and forest trees, than has hitherto been supposed.

It is known to farmers that the Leguminosæ (Peas, Beans, Vetches, Clover, etc.) in conjunction with certain species of

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soil bacteria, have the power of fixing the atmospheric nitrogen and storing it up in their roots in the form of nodules, which act beneficially on the following crops. This action of the nitrifying bacteria is produced under the influence of the fungus *Rhizobium leguminosarum.*

The Leguminous plants develop these root tubercles most readily in soil deficient in nitrogenous food substance and less in soil rich in humus and nitrogenous matter.

Virgil (b. B.C. 70), when writing on the cultivation of the soil in his Georgics, Book I., is aware of the advantage of a corn crop following a leguminous one when he says :

> '. . . . where, vetches, pulse, and tares have stood,
> And stalks of lupines grew (a stubborn wood),
> The ensuing season, in return, will bear
> The bearded product of the golden year : '
>
> Dryden's Translation.

Having said so much for the good influences of Fungi, we may now consider how they militate to the injury of mankind, by lessening the food supply or by damaging its quality by means of the many forms of plant diseases which go by the names of smut, rust, mildew and blight in corn, canker and rot in fruit, ' demic ' disease in potatoes, and many others so well-known to farmers, gardeners and timber growers.

The number of diseases to which human flesh is heir, is exceeded by the number of diseases to which plants are liable ; and as the study of human diseases has resulted in the alleviating and in the prevention of much suffering and loss of life ; so the study of the life history of these fungal diseases furnishes us with the means of combating them, and thereby lessening the loss on our corn and fruit crops and our timber supplies.

Such knowledge empowers us with the means to receive the most good from the hands of Nature and to avoid that which might be injurious.

It is not easy to estimate the world's annual loss from the depredations of Fungi, but competent authorities are agreed that the total loss caused by fungi to corn, fruit and timber exceeds £300,000,000 per annum, much of which could be averted by remedial measures.

In this direction reference may be made to the statistics issued by the Agricultural Department of the United States where plant diseases are more studied than in any other part of the world.

The principal estimated losses recorded are as follows :—

The annual loss from	Rust in Wheat	£15,000,000
,, ,,	Potato Disease	£7,000,000
,, ,,	Vine Disease in California	£2,000,000
,, ,,	Smut in Wheat	£3,000,000
,, ,,	Bitter-rot in Apples	£2,000,000

totaling, with some of the minor diseases, to over £50,000,000 per annum. The Prussian statistics for the year 1891 estimate the injuries to corn crops alone, to be over £20,000,000.

No statistics are available for Britain, France, Russia, Canada, Australia or South America.

These figures will suffice to emphasize the destructive effect of plant diseases when not under control.

One of the most destructive of the parasitic fungi is the Rust of wheat (*Puccinia graminis*) which affects the leaves so much as to lessen the vitality of the plant, thereby reducing considerably the quality and quantity of the corn produced.

This fungus pest has been known for thousands of years ; many of the ancient writers refer to it, Pliny several times mentions it, and in one passage calls it ' the greatest pest of the crops.' They tried to account for its presence in various ways such as evil spirits, * the weather, lightning, blight, wrath of the Almighty, etc. Virgil suspected the proximity of Juniper bushes to be the cause when he says :

> ' From Juniper unwholesome dews distil,
> That blast the sooty corn, the withering herbage kill.'
>
> Pastoral X.

The Romans held on April 25th in each year a festival called Rubigalia to implore their deities to ward off the Rust disease and to protect their crops from this fungus pest.

The study of the life history of this Rust disease has been for many years pursued by plant pathologists on account of its importance economically, and of its great interest biologically as it passes through three well-defined stages in its existence, each of which was formerly considered a separate entity.

The first appears in spring on the leaves of Barberry and shrubs of that natural order in the form of yellow cluster cups producing spores (æcidiospores) which, when carried by wind and other agencies, infect the young wheat plants, causing them in a few weeks to have a rusty appearance due to small bright orange patches filled with power (uredospores) and the infection of the surrounding plants quickly takes place. From these same patches, a few weeks later, another set of spores arise, purple black in colour (teleutospores) which lie dormant all the winter and infect the Barberry leaves in spring.

For two or three centuries past it was noticed that the presence of the Barberry had an injurious effect upon the wheat crops, and a law was passed in 1755 for the extirpation of all Barberry bushes in the province of Massachusetts in America,

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* . . . The foul fiend Flibbertigibbet mildews the white wheat.
King Lear, Act III., Scene IV.

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but the biological connection between the three forms of the pest was not suspected until Professor De Bary in 1864 proved by cultures that they were three stages in the life history of the fungus plant *Puccinia graminis.*

The wild barberry is absent from this district but the Rust disease is very prevalent, and there is still some uncertainty how the first gets over the winter months under these circumstances. Experts are of opinion that the uredo or summer spores perpetuate the disease by infecting grasses in sheltered places and perhaps by the mycelium of the uredospore lying dormant in the grain.

Nearly two hundred species of Rusts have this heteroecious mode of life.

The Bunt in Wheat (*Tilletia Tritici*) is another pest which unlike the Rust completes its life-cycle on the same plant, infecting it at an early period and growing up through the season in the tissues of its host, appearing at harvest as black spore masses within the chaff. When this sooty mass is bruised, it emits a disagreeable fishy odour which is often perceptible in the holds of wheat-laden ships, indicating its presence in the wheat-growing countries abroad.

The infection takes place whilst the plant is in the seedling stage and it is noticed that where a plant is infected, it is always found that every ear of the plant and every grain in each ear is destroyed. This would not always be the case if the plant was infected at maturity by spores conveyed by the wind or other agencies.

The disease is more prevalent in spring-sown than in autumn sown corn, the reason being that the late autumn weather is not so favourable to spore germination as the spring, and in the case of autumn-sown wheat the young plant by springtime is proof against infections.

Gerard the botanist, writing in 1597, on the pests of the Corn Crops, says :—

> I. *Hordeum ustum* or *Ustilago Hordei,* is that burnt or blasted Barly which is altogether unprofitable and good for nothing, an enemy unto corne ; for that instead of an eare with corne there is nothing els but blacke dust, which spoileth bread or whatsoever is made thereof.
>
> II. Burnt Otes or *Ustilago Avenae* or *Avenacea* is likewise an unprofitable plant, degenerating from Otes, as the other from barly, rie and wheat. It were in vain to make a long harvest of such evil corne, considering it is not possessed with one good qualitie. And therefor thus much shall suffice for the description.
>
> III. Burnt Rie hath no one good property in physicke appropriate either to Man, Birds, or Beast and is an hurtful maladie unto all Corne where it groweth, having an ear in

shape like to Corne, but in stead of graine it doth yeeld a blacke pouder or dust, which causeth bread to looke blacke, and to have an evill tast: and that Corne where it is, is called smootie Corne and the thing it self, Burnt Corne, or Blasted Corne.

Three woodcuts are given, perhaps the oldest pictures known of the effects of the pest *Ustilago*. These woodcuts, illustrating Gerard's Herbal, were printed from blocks procured from Frankfort, being the same blocks which had been used for the 'Kreuterbuch,' the German Herbal of Tabernæmontanus in 1588.

Ergot of Rye (*Claviceps purpurea*) produces terrible effects when taken into the alimentary canal by man or animals, causing gangrene of the extremeties and other maladies. It has the effect of causing muscular contraction and by stopping the supply of fresh blood to the limbs causes them to rot and fall off. It is also extremely injurious to sheep and cattle during the breeding season. Ergot may be observed in almost every rye field during June and July by the blackish horn-like growths taking the place of the grain and projecting from the ears often an inch or more in length. Many of these sclerotia(=compacted mycelium) fall to the ground and remain dormant until the spring, when they produce small drumstick-like bodies covered with flask-shaped cavities filled with spores which, when liberated, infect the flowers of the corn. Many of the grasses and sedges are affected with ergot in a similar manner to the corn crops and are able to convey the infection to the cereals, although it is noticed that the ergots on grasses vary their time of germination to suit the flowering period of their hosts.

That the ergot of grasses infect corn was suggested last summer by the appearance of a rye field on the edge of a common in the Selby district which was affected to quite ten per cent. whilst near by the wild grasses *Lolium perenne* and *Holcus lanatus* were similarly affected, but in the part of the field distant from the grasses the infection of the crop did not reach one per cent. In this country, where the practice of crop rotation is generally followed, the diseases of the crops are not so virulent as where constant growth of the same crop prevails, the interval being usually sufficient for the decay of the resting spores although the vitality of some species is remarkable, for instance, Ergot. In the spring of 1916, some sclerotia of this, labelled July, 1880, was taken from the cabinet and placed on moist sand in a Petrie dish, and in about a month several ascophores of *Claviceps purpurea* were developed so that the thirty-six years of complete dessication had not destroyed the vitality of the plant.

Crop rotation has been able to ward off the Black Wart disease of Potatoes (*Synchytrium solani*), a pest which has

lingered for several years in some allotment gardens near Selby, where year by year the potato is the staple crop but is quite unknown to the farmers in the district where the usual crop rotation is observed, although experiments at Kew prove that the resting-spores in the soil are capable of imparting the disease for five years. The spores are $40 \times 70\mu$ diam. and are not so easily carried by the wind as are those of *Phytophthora infestans*, which measure only $25 \times 15\mu$.

The Potato Disease (*Phytophthora infestans*), which causes such enormous losses in favourable seasons, made its appearance in this country in 1845, and is now known in every part of the globe where the potato is grown.

In dry weather, it does not assert itself, but when favoured by moist warm weather the disease becomes of serious importance. The usual mode of infection is through the leaves by conidia brought by the wind. Each conidium contains six or eight oospores which when liberated germinate at once on the moist leaves and send out tubes penetrating the stomata or boring through the cuticle, down the stems to the tubers, which may either be destroyed at once or they may receive the infection so lightly as to remain apparently sound until the following spring; these, when planted, produce the disease in their offspring, ready to break out under favourable climatic conditions to complete the life-cycle.

The American plant-pathologists have much confidence in the spraying of the plants with Bordeaux mixture; (Copper sulphate 5 lbs., Quicklime 5lbs., Water 50 gallons). They claim that by spraying the disease is held in check, and also that the fungicide invigorates the foliage.

The principle fruit disease with us is the Apple Scab and Canker (*Venturia inæqualis*). The variety of fruit bearing the disease is usually condemned instead of laying the blame on the pest, and very little attention is paid to its eradication, but in the South and West of England, Canada, the United States and Australia, where pomaceous fruits are extensively grown, every endeavour is made to cope with it by pruning and spraying, which methods are in the main successful.

Our timber trees bear parasites which, unlike the microscopic ones previously mentioned, are composed chiefly of large agarics and polypores. The destruction of the wood is caused by the mycelium permeating the tissues of the wood like the dryrot fungus (*Merulius lacrymans*), or by sending out cord-like strands between the wood and the bark, robbing the host of its sustaining fluids and eventually causing strangulation.

The questions will naturally be raised: 'Has the biological study of these organisms resulted in any economic success?' The answer is Yes, decidedly. For instance:—

The Pine Disease (*Peridermium pini*) may be exterminated by clearing away all plants of the Genus Senecio (Groundsels and Ragworts) upon which it passes one of its life-stages.

Anbury or Finger and Toe. (*Plasmodiophora brassicæ*) in Cruciferous plants (Turnips, Cabbage, etc.), can be prevented by making the soil non-acid by limeing and by keeping in check weeds of the same Natural Order in the field sides and headlands.

Fruit Scab and Canker (*Venturia inæqualis*) is averted by spraying with Bordeaux mixture and by pruning off the infected twigs.

The Damping off of Seedlings (*Pythium debaryanum*) is checked by ventilation and similar treatment as for Anbury.

Smut and Bunt in Corn. (*Ustilago* sp. and *Tilletia triteci*) may be minimised by dressing the seed corn with formaline or copper sulphate.

Dryrot in Timber (*Merulius lacrymans*) may be prevented or eradicated by proper ventilation and by the application of creosote solution.

We read much about the breeding of plants which are immune to certain diseases, but we have yet to learn of what this so-called immunity consists. Is it because the stomata are too small for the germinating hyphæ of the spore to enter, or is the virtue in the harder and less succulent epidermis of the plants? Dr. A. D. Selby has pointed out that in the study of disease susceptibility it has been shown that other features being the same, the percentage of water is an index: thus, parts having the higher water content are attacked more readily than those with a lower water content.*

Few will doubt that certain plants have been raised which, so far, are disease resistant, and we must be thankful for these, even if their raising has been brought about by guesswork methods; there is, however, the fear that when circumstances of climate, soil or moisture are favourable, the disease will reassert itself. In this district the Potato is extensively cultivated and any fact relating to its growth or life history is of interest.

Some years ago I pointed out to Mr. Massee that the microscopic structure of tubers immune to and those subject to the disease (*Phytophthora infestans*) differed, inasmuch as the former has much thicker cell walls than those of the latter. Mr. Massee desired me to verify this by growing a number of varieties under the same conditions of soil, climate and moisture, and he sent me some thirty or forty named sets, which were planted and grown in a plot under the same conditions, when further microscopical examination was made confirming my

* Ohio Exp. Sta. Bull., 214: March 1910.

previous results; thus the varieties with thick cellulose cell walls were always watery or soapy when cooked and the varieties with thin cell walls were always mealy or floury.

When a variety is newly raised from seed it has a thick cell wall and is consequently undesirable in the market for its cooking qualities, however desirable it may be for its productiveness on yielding larger and better shaped tubers. It is then to a great extent resistant to the disease; after a period of growth, the cell walls become thinner and the tuber more desirable for the table, but often losing its high productivity, and at the same time becoming more susceptible to disease; hence many of the old varieties are completely discarded on that account, although much esteemed for table purposes.

It was recently pointed out in the *Journal of Agriculture* that the enzyme, the function of which is to convert the starch into sugar so as to be directly available for growth, has to a great extent ceased to exist, hence growth or sprouting is checked, and it is now believed that this enzyme existing in considerable quantity in a thick cell-walled tuber is the natural fungicide protecting the plant against the attacks of its pest.

Eight to twelve years seems to be the period a variety of potato takes to run from infancy to old age, when its vitality is lowered, is then subject to disease, and its productivity much diminished. A fillip may be given to the plant by a change of soil and climate, even as sometimes a change of air and occupation is to ourselves.

Many troublesome skin diseases such as Ringworm, Barbers' rash, Thrush in infants, etc., are attributable to fungi, in fact all human diseases which are infectious or contagious are caused by micro-organisms which may be regarded as of a fungoid nature. The salmon of our rivers and the gold fish of our ponds often suffer from a destructive parasite (*Saprolegnia ferax*) which causes the fish to become sick, sluggish and eventually to die, but broadly speaking, Fungi seem to be more fatal to insects than to the other branches of the animal kingdom. Much loss is caused in some years by the malignant silkworm-disease (*Botrytis Bassiana*) and beekeeping is becoming almost impossible at home in consequence of the scourge known as the Isle of Wight bee disease, which has so far baffled experts to counteract. Some insects seem to have a tendency to favour the attacks of a singular class of parasitic fungi, the mycelium of which permeates the dormant and buried chrysalis, sending out an orange-red fleshy club-shaped stem projecting two or three inches out of the ground and tuberculose with flask-shaped bodies containing spores in asci. This fungus (*Cordyceps militaris*) is not uncommon in damp woods during the autumn months. It is a debatable point whether the fungus is parasitic or saprophytic, but the stronger weight

of evidence is towards the former character. A rare species of this group with a globose head (*C. capitata*) was found at one of our forays two years ago.

Some wonderful examples of Cordyceps often reaching to six or eight inches in length are found in Australia and New Zealand ; they are eaten by the Maoris as a *bonne bouche* and are also collected and sold to visitors as curiosities.

I trust the few examples I have given of beneficial and injurious Fungi will suffice to show the important part Fungi play in the economy of Nature, and that the study of Mycology is worthy of our serious consideration.

National legislation might be profitably directed to the employment of universal measures for combating fungoid plant-diseases, the individual efforts, however well applied, will be nullified by careless neighbours as the spores are in most cases windborne. Laws are provided for protecting man and animals from infectious diseases and it is also essential that the infection of our crops should be guarded against by:—

(I.) Instruction by experts in the nature of plant diseases, their appearances and easy recognition, methods of prevention and remedies for the control, checking, or extirpation of the destructive parasitic organisms.

(II.) The exhibition of affected plants in museums and educational centres.

(III). More stringent means for preventing the introduction of fresh diseases into new localities or countries.

(IV.) To inculcate the value of crop rotation, whereby the continuity of the life-cycle of the fungus is broken.

(V.) Further study and investigation into the nature of resistent and non-resistent crops.

(VI.) The removal of complementary hosts in infected areas.

(VII.) Further experiments in the efficacy of spraying, protective to the host and destructive to the parasite.

(VIII.) The appointment of more mycologists, specially trained in plant-pathology.

Let me recommend to the delegates of Yorkshire Naturalists' Societies the encouragement of the study of Fungi by their botanical members. Some previous botanical knowledge is really necessary, before entering the field of Mycology, but one is convinced they would find this an attractive and interesting section, furnishing work at a time when most of the flowering plants are at rest. To the microscopist, Fungi present objects of great beauty and diversified forms.

Full use should be made of the British Museum booklets on Fungi and Mycetozoa, which are alone sufficient to enable students to recognise very many species commonly found in all districts. The drawing, painting and photographing of

specimens is advised, as work of this kind enables the student to grip the characters and leading features better than by any other means, for after a drawing or painting is made the image of the plant and its salient features are often strongly impressed upon the memory.

A leading spirit is very desirable to give inspiration and guidance, and this must be found, if not amongst the members themselves, then such a leader must be sought for in some expert outside the Society.

The specimens and classification should be explained and described in simple language so as not to deter the student.

Scientific terminology is quite right when the majority of the audience can follow the speaker, but it is often discouraging to the earnest enquirers for information ; it must be remembered that most of our members in local Societies have not had the previous training to enable them to understand the mysteries of Nature couched in professional phraseology. Let them be led by degrees to unfold the treasures which Nature offers to those who seek her shrine.

After the student has decided to take up the study of Mycology, a general review should be made of the classification, and before long, some section of this large subject will appeal to him. It is very desirous that whilst knowing ' something about everything,' he should endeavour to know ' everything about something ; ' in other words he should specialise on some particular class, order or genus. By so doing, he will derive more pleasure and satisfaction, and also be able probably to contribute a mite to the general stock of knowledge on his particular selected subject.

The student must not be content with names alone, but should strive for an intimate knowledge of the structures, forms and life histories of these organisms which are often of great microscopic interest, opening out thereby a new world of beauty and wonder with appearances as diversified and fruits as multifarious as the trees and plants of the familiar world, to be enjoyed only by those who delight in perusing the picture book of nature.

> And Nature, the old nurse, took
> The child upon her knee
> Saying ' Here is a story-book
> Thy Father has written for thee : '
> ' Come wander with me,' she said,
> ' Into regions yet untrod,
> And read what is still unread
> In the manuscript of God.'
>
> LONGFELLOW.

NOTES ON PLANORBIS AND MARGARITANA IN ICELAND.

HANS SCHLESCH.
Hellerup, Denmark.

It is noteworthy that these genera have not been found in Iceland for nearly fifty years, and the species may be looked upon as either of doubtful occurrence or of only temporary introduction, except *Planorbis arcticus* Beck, which also lives in Greenland, Northern Scandinavia and Finland.

Planorbis (*Gyrorbis*) *leucostoma* Mill. (=*rotundatus* Poiret).
W. Reykjavik Tjörnin (Steenstrup and Hallgrimsson)·
Laugarnar near Reykjavik, 1868 (Grönlund).

Planorbis (*Gyrorbis*) *spirorbis* Linné.
W. Reykjavik, 1877 (Th. Thoroddsson, spec. in Reykjavik Mus.)

Planorbis (*Gyraulus*) *glaber* Jeffreys.
Recorded from Iceland by Westerlund (Synopsis Moll. Extram. Scandinav., 1897, p. 122).

Planorbis (*Gyraulus*) *arcticus* Beck.
N. Myvatn, 1876 (Th. Thoroddsson, spec. in Reykjavik Mus.).

Margaritana margaritifera Linné.
W. Reykjavik, 1863 (Israel).
Remarks: The well-known *Unio* collector, the apothecary Israel wrote (20th March, 1914) to me about this interesting find, 'I have in my collection a specimen, big, thick-shelled, plump form, which my father found *living* in a streamlet near Reykjavik in the year 1863, while he was a private teacher in the house of a Danish nobleman.'

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Mr. W. N. Cheesman, J.P., has presented a collection of myxomycetes to the Botany department of the Leeds University.

In a paper on 'The Development and Morphology of the Ammonite Septum,' by Prof. Swinnerton and Mr. Trueman, recently read to the Geological Society of London, two methods of studying the septum (not merely the suture) were used:—(1) Cleaning the face of the septum completely; (2) filing away the surface of the whorl in successive layers, and thus making a series of sections—called septal sections—of the septum parallel to its periphery.

We have just received *The Lancashire and Cheshire Naturalist* for February and March, which completes Vol. IX. As these 'have been turned out almost entirely by one pair of hands,' it would perhaps be unkind to criticise the typography; to prevent mistakes in binding, however, it is as well to point out that the first page in the February issue should be 281, not 261. Among the subjects discussed are Midge-Galls; Arachnida; Ornithology; a record of a rare wood-louse (*Porcellio ratzeburgii*); Mite-Galls; 'Castration-Parasitaire' in insects; Nature Study in Schools; School Gardens; Querns in North Wales; The Charles Bailey Herbarium; and Oikogetons. Most of the papers refer to Lancashire or Cheshire.

In Memoriam.

W. BARWELL TURNER.

THE decease of William Barwell Turner removes one who, in his time, played no mean part in the development and advancement of science in Leeds. A native of Warwickshire,* he came to Leeds in 1877, soon gravitated to the Naturalists' Club, and became one of those who made the Society one of the most successful of its kind. It was in the days when as yet there was no University, not even the Yorkshire College of

Science which was its precursor, and at that time the Naturalists' Club was one of the principal centres of intellectual progress in the city, as the subsequent careers of many of its then members demonstrated.

Our subject was the son of Thomas Turner, and of his wife Sarah, the daughter of William Barwell, of an old Birmingham family. He was educated at a famous institution, King Edward's Grammar School, at Birmingham. On leaving, he entered the service of Samuel Allsopp and Sons, the famous brewers of Burton-on-Trent, where he learned the business thoroughly, especially on its scientific or chemical side. This

* Born at Birmingham 9th June, 1845; Died at Leeds 11th May, 1917.

was from 1861 to 1866. He then entered breweries at Plymouth, at Watlington in Oxfordshire, and Bruton in Somersetshire; then in Staffordshire, and finally came to Yorkshire in 1876, being first at Bentley's Brewery at Woodlesford. In 1877, he settled down in Leeds as manager of the Brunswick Brewery, and was married in the same year to Miss M. E. Jones, of Bruton, Somerset. He left the Brunswick service in 1884, and set up in private practice as Consulting Brewer and Analytical Chemist. In 1891, he was stricken down by a grievous illness, which rendered him more or less an invalid for the remainder of his life, and necessitated, in 1909, the amputation of one of his legs. This illness was to him a more

W. Barwell Turner's Book Plate.

than ordinary trial, cutting short the various activities of a busy man. He was essentially a man of strong and active constitution, powerful build and unceasing energy, of the nature to whom enforced inaction was in the highest degree irksome and tedious.

The interest to readers of a journal like this lies more in his scientific proclivities, his leisure-time hobbies, than in his professional career.

As a member of the Leeds Naturalists' Club, of which he was President in 1881, he devoted himself to microscopical research, and he energetically conducted the microscopical section of the Club. He directed his own attention more particularly to the fresh-water algæ, and was in this a fellow-worker with various others, including Otto Nordstedt and

William West, and published various papers. In *The Naturalist* for October, 1879, pp. 38-40, appeared ' The Fresh-water Algæ of the Leeds District.' A paper on the ' Algæ of Strensall Common ' was printed in the same journal for December, 1883, with a plate by himself. In *The Naturalist* for September and October, 1887, he printed notes on Algæ collected at Gormire and Thirkleby, describing a new species. In *The Transactions of the Leeds Naturalists' Club*, Vol. I., 1886, he published, along with other Leeds microscopists, an Alga-Flora of West Yorkshire. Other algological papers by him were, one on ' Mounting and Staining Desmids (*Journ. R. Microsc. Soc.*, Series 2, Vol. V., 1885, p. 742) ; ' On some New and Rare Desmids,' with two plates (same vol., Dec., 1885) ; ' Notes on Fresh-water Algæ, with Description of New Species ' (*The Naturalist*, Feb., 1886, with a plate) ;' Desmid Notes ' (same journal, Nov., 1893).

The most important publication of his was his monograph of the Indian Desmids (Algæ aquæ dulcis Indiæ Orientalis, the fresh-water algæ (principally Desmidieæ) of East India). This was, through the influence of his friend, Otto Nordstedt, published at Stockholm in 1893 by the Royal Swedish Academy of Sciences, and was illustrated by 23 plates by his own hand. Had it not been for the unfortunate breakdown of his health, his algological work would have been continued, to the great benefit of science.

As it was, he was henceforth restricted to the study of another subject on which he was a leading authority. He was an ardent student of genealogy and heraldry, for which his remarkable skill as a draughtsman, his equally remarkably retentive memory, and his painstaking industry, peculiarly qualified him. A series of heraldic drawings by him was shown to the King when he visited the Leeds University in 1915, and much interested His Majesty.

The man himself was, however, the most interesting. Tall and well built, remarkably handsome in appearance, he was essentially a strong and vigorous personality. Constitutionally and physically strong, in spite of his serious illness—strong in will, strong in his opinions, which were expressed in copious and vigorous language, he combined with it all a delicacy of touch, refinement of feeling and keenness of insight, which peculiarly fitted him for the studies which were his hobbies. His eyesight, too, was remarkably powerful and microscopic. In his youth, although town-born, he was country-bred, with the instincts of a sportsman, as was his father before him. He was an excellent shot, having learnt the art as early as nine years of age, and at seventeen, when at Burton-on-Trent, he joined one of the then recently formed Volunteer Corps. In his intercourse with his friends over a pipe and a cup of tea—

for he was ever an inveterate smoker and enjoyed the cup the contents of which he was fond of describing as worse than intoxicants—his picturesque and copious flow of language gave expression to his views on things in general, and upon various questions of Church and State in particular. He was a Churchman and a Conservative of the views congenial to the famed squire of Blankney.

His wife survives him, also a daughter and four sons, in whom are repeated some of the paternal characteristics. All have the love of country life, and the artistic and other attainments find repetition. The second son, Cecil, was at one time Hon. Secretary of the Leeds Naturalists' Club, and the eldest shares his father's taste for heraldry. The younger sons are on active service abroad, Geoffrey in France, Noel with the Indian Army in Mesopotamia with a commission in the cavalry, for which his knowledge of Hindustani, acquired while five years in Upper Assam, is a qualification.—R.

——: o :——

WILLIAM FOGGITT, J.P., F.L.S.

1835—1917.

THERE is perhaps no locality in the kingdom, probably not in the world, which has produced so remarkable a cluster of able botanists as North East Yorkshire, and especially that portion of it known to politicians as the Thirsk and Malton Division. In proof of this it is sufficient to cite such names as Spruce, Ibbetson, Stabler, Massee, Slater, and more particularly John Gilbert Baker, all of whom have made their mark in the development of botanical research.

Among these is William Foggitt, who has just passed away.

While still at school he contrived during the leisure of summer days to collect no fewer than 500 specimens of British plants, which he pressed and catalogued. Leaving school at 13, during an apprenticeship to his father's business, he was helped in the same direction by a close friendship formed with a youth of similar tastes, John Gilbert Baker. Their joint rambles resulted in the formation of a very fine herbarium, and they co-operated in forming the first Natural History Society in Thirsk. For some time William Foggitt gave weekly botanical lessons at Thirsk High School, and took walks into the country with the scholars, where growing specimens were described to them. He possessed a delightful fund of humour, and his reminiscences of the many and varied experiences when botanising in different parts of the country were a treat to hear.

In 1903 he was elected a Fellow of the Linnæan Society. He was one of the Entomological Committee of the Yorkshire

1917 June 1.

Naturalists' Union, honorary member of the Scarborough Natural History Society, and one of the original founders of the Thirsk Natural History Society. In the last-named he evinced a very special interest, was never absent from its meetings, and always had a good collection of exhibits, which it was a pleasure to hear him describe.

Mr. Foggitt, who was a magistrate for the North Riding, married a daughter of the late John Blackett, currier, Thirsk,

but she died some years ago. There was a numerous family, of whom five sons and three daughters survive. Two of the sons are abroad, and the remaining three are all following in the footsteps of their father, not only in their love for natural history, but in business affairs.

——: o :——

The annual meeting of the Leeds Philosophical and Literary Society was held recently. The report, submitted by Prof. W. Garstang, regretted that the attendance at the lectures was far from satisfactory, and mentioned that the Council was obliged to consider whether some rearrangement of the normal meetings of the society might not be necessary for the ensuing session. ' The increasing popularity of the museum,' the report proceeded, ' is a pleasing feature of the year, the number of visitors having surpassed even the record numbers of the previous year.' Under the Leeds schools museum scheme 136 schools had sent 13,000 children, and by the end of the month between 15,000 to 16,000 would have passed through the able hands of Mr. Crowther. At the beginning of the year there was owing to the treasurer £622 and at the close the adverse balance was £711. Altogether the deficit for the year was £114.

FIELD NOTES.

FUNGI.

Mycology at Buckden.—Miss E. M. Wakefield, of the Herbarium, Kew, points out that *Odontia farinacea* and *Tomentella fusca* are not new British records as described.* *Odontia farinacea* is merely the more modern way of naming *Hydnum farinaceum*, a very old species, whilst *Tomentella fusca* was first recorded from Clare Island some years ago and has been listed at nearly every foray of the British Mycological Society, as well as at Yorkshire Forays since then.—A. E. Peck, Scarborough.

—: o :—

COLEOPTERA.

***Atheta britteni* Joy in E. Yorks.**—Several specimens of this interesting beetle have been discovered in flood refuse from the River Derwent, at Bubwith (Dec., 1916), by Messrs. E. A. Newbery and W. E. Sharp. The species was described by Dr. Joy (E.M.M., 1913, p. 154), on four specimens taken in flood refuse in Cumberland in May, 1911, and the only other record is of about thirty specimens from Sutherlandshire, in May, 1914, also from flood refuse (E.M.M., 1914, p. 195). —Wm. J. Fordham, Bubwith.

—: o :—

BIRDS.

The Storm and Gulls.—At a large munition works in the West Riding, where thousands of girls and men are employed filling shells, there is a large refuse heap. When the severe weather commenced at the beginning of the year, a few gulls found it out; their numbers rapidly increased until a very considerable flock, chiefly Black-headed and Herring Gulls, frequented it regularly every day, and are still there. They evidently found an abundance of food and are loth to leave it, for at the time of writing they are as abundant as ever.—R. Fortune, Harrogate, March 2nd, 1917.

———: o :———

Illustrations of the British Flora, by **W. H. Fitch** and **W. G. Smith**, 4th ed., revised; L. Reeve, 1916. This very useful book of illustrations is too well known to botanists to require further commendation for this revised edition. Several improvements have been made, *e.g.* clear diagrams are given, illustrating the relationships of the floral organs which are characteristic of the four classes of Dicotyledons, and there is an arrangement of natural orders or families, with their characters given in sufficient detail to enable the family to be determined. The illustrations though small, are clear and are better printed than in some earlier issues. To each scientific name under the figure are added, not only the synonyms in many cases, but also the common name, and the colour of the flower is also indicated.

* *Naturalist*, March and April, 1917.

NEWS FROM THE MAGAZINES.

The Journal of the Board of Agriculture contains a paper on ' Sclerotinia Diseases.'

Mr. T. A. Chapman writes on ' The Genus Hesperia,' in *The Entomologist's Record* for May.

The Rev. C. R. N. Burrows writes on ' The British Psychides ' in *The Entomologist's Record* for April.

An illustrated article on ' Leaf Spot of Celery ' appears in *The Journal of the Board of Agriculture* for April.

In *The Irish Naturalist* for May, the Rev. W. F. Johnson writes on ' *Lissonota basalis* Brischke in Ireland, an addition to the Britannic List.'

In *Man* for May, Dr. T. E. Nuttall writes on the Piltdown Skull, in which he seems to take views intermediate between those of Dr. Smith Woodward and Dr. Keith.

In *The Entomologist's Monthly Magazine* for May, Mr. James Waterston writes ' On a New Species of *Docophoroides* Gigl. (*Eurymetopus* Tasch.) from an Albatross (*Diomedea melanophrys*) ' ; and the specimen is figured.

In *The Geological Magazine* for May, Mr. H. L. Hawkins writes on ' The Sunken Tubercles of *Discoides* and *Conulus*,' and Dr. F. A. Bather writes on ' The Base in the Camerate Manocyclic Crinoids.' In the latter, Dr. Bather refers to his ' unforgiveable habit of offering up his own interpretations of what he does not thoroughly understand in the works of other authors.'

Wild Life for April contains the following papers :—' The Life Story of the Liver-fluke,' by I. W. Lindsay ; ' The Sparrow-Hawk at Home,' by T. M. Fowler ; ' Birds, Insects and Crops,' by The R.S.P.B. ; ' Pertaining to Common Buntings,' by E. E. Pettitt ; ' Notes on the Kestrel,' by E. Eykyn, and 'The Puss Moth.' The part is illustrated by 22 reproductions from photographs.

Referring to the note in *The Naturalist* for May (p. 176), to the effect that the natural history collections at the University College, Nottingham, were to be transferred to Bulwell Park, we are glad to learn that this is not to be. Some such suggestion was certainly made, but was promptly ' squashed ' by the City Council. The collections therefore remain under the care of Prof. Carr. We obtained our information from the *Museums Journal*, which we naturally assumed would be reliable.

The Athenæum says ' We hope it will be recognised that men of science have much to learn in the way of clear expression of their results.' To this, *Science Progress* replies : ' Agreed ; and, while literary persons invariably express themselves perfectly, we hope they will recognise that they seldom have anything to express. It would be an excellent thing if a literary man were to be appointed to every laboratory in order to attend to the style of the investigator and, also, to learn the difference between real and imaginary work.'

In *British Birds* for April, 1917, Mr. J. B. Nichols records a White's Thrush shot in Sussex in December, 1915, and ' seen in the flesh ' by Mr. F. Lindsay ; another shot at St. Leonards on February 26th, 1916, and was ' seen in the flesh ' by Mr. R. Butterfield. But why this delay in recording such apparently important finds ? On page 296, Mr. J. H. Gurney thinks that the Calander Lark from Devonport ' worthy of some consideration ' (see *Naturalist*, April, page 146). The editor of *British Birds* still maintains that although it was ' certified ' the bird was killed by St. John's Lake, and was seen in the flesh by the taxidermist, he is ' strongly of the opinion that such a record should not be accepted.' Yet, on precisely similar evidence, he accepts new British records, from Sussex, in *British Birds*. We should like to congratulate the editors of *British Birds* on the completion of their first decade.

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NOTES AND COMMENTS.

SOUTH EASTERN NATURALISTS.

The members of the South Eastern Naturalists' Union, although finding it inconvenient to hold their annual conference at Reading, as was arranged a year ago, yet wisely decided to 'carry on.' From June 6th to 9th the Union's Conference was held in London, the rooms of the Linnean Society being kindly lent for the purpose. These rooms—even the large lecture theatre—proved too small, however, so well attended were the meetings. That the Council acted wisely in deciding to hold a conference was demonstrated by the fact that about 150 members and associates took part in the meetings and excursions. These were by no means all Londoners, but assembled from the various counties in the South East of England.

THE BULLETIN.

A useful feature was the publication of daily bulletins of four or eight pages each—five of which were issued in all. These gave details of the forthcoming meetings, as well as criticisms of those which had passed, with occasional items of miscellaneous information more or less connected with the Union and its work. They were edited by Mr. E. A. Martin, F.G.S., the brother of the President, Dr. W. Martin, F.S.A. The editor proved to be an excellent trumpeter !

THE PRESIDENT'S ADDRESS.

Mr. E. A. Martin tells us that his brother's Presidential address was much appreciated. " In great and eloquent words the address will fall on willing scientific ears as a clarion call to the service of arms at the present moment, and in the service of peace in a happier time to come. The conclusion reached a noble height, and we here reproduce the epilogue :—' My prologue was pitched in a minor key. The epilogue to my story demands a less plaintive strain. But perhaps the keen ear may have already detected dominant notes suggestive of a brighter, even if not, a joyous theme. " England's on the anvil—hear the hammers ring—Clanging from the Severn to the Tyne." Amid the upheavals to which industries have been subjected during the beating of ploughshares and pruning-hooks into implements of war, it may be that the Country has already proceeded apace towards greater triumphs. Old machinery has been scrapped, antiquated custom flung away, and resources have been adapted to the stern demands of a People under arms. With new measures, new men have arisen.

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Unity, organisation, co-ordination, precision are the weapons with which without misgiving the future may be faced. And

when the present conflict shall be as a far off, unhappy tale of long ago, and this our brief hour's traffic of the stage shall have run its course, the stimulus which has compelled each to offer his truest and best for the commonweal will prove an abiding force. And may we not fitly anticipate the time when from the ashes of an otiose past and an age of neglect, a rejuvenated nation will have arisen among whom lethargy and indifference shall be as aliens? At such a time, we shall regard the period before the shock of war was upon us as the ultimate remnant of the Dark Ages and shall fail to understand that mental attitude which considered science a luxury and its application to the industries in need of advocacy. Proceeding to eradicate the ugly and horrible effects of the War, we the children of the Great Awakening will prove ourselves, by devotion to science with its train of blessings, worthy followers of those who for King and Country were called upon to make the supreme sacrifice.' "

A FULL PROGRAMME.

Besides the meetings of Committees and Delegates, the following interesting events took place:—*Wednesday* (afternoon), visit to Westminster Abbey under the guidance of Canon Westlake; (evening), Presidential Address on 'The Application of Scientific Method,' by Dr. Martin. *Thursday* (morning), Dr. A. Smith Woodward, a lantern lecture on 'Vertebrate Remains from London Excavations'; (afternoon), visit to Lincoln's Inn (Old and New Halls, Library and Chapel), conductor, Dr. W. Martin; address in the Natural History Museum, South Kensington Museum, on 'Some Skulls and Jaws of Ancient Man, and his Implements,' by Mr. E. A. Martin; (evening), joint meeting with the Linnean Society to hear the 'Hooker' Lecture by Prof. F. O. Bower. *Friday*: a lantern lecture 'Are Acquired Characters Inherited,' by Prof. E. W. MacBride; and 'Tokens of London,' by Mr. W. Dale, F.S.A.; (afternoon), visits to Munitions Inventions Department, and to a Munitions Factory; and an address on 'Reptiles in Captivity,' by Prof. G. A. Boulenger, in the Zoological Society's Gardens; (evening), lecture 'Notable Trees and Old Gardens of London,' by Dr. B. D. Jackson. *Saturday*: (morning), lecture 'Abnormal Atmospheres and means of Combating them,' by Dr. J. S. Haldane, F.R.S.; (afternoon), visit to the Chelsea Physic Garden, and a paper on 'The Associations of the Garden with the History of Botany,' by Prof. G. S. Boulger; visit to Messrs. Siebe Gorman and Co's. Diving and Mine Rescue apparatus works, under the direction of Dr. J. S. Haldane. Considering the large numbers present, the arrangements made were excellent, as the writer, who was privileged to take advantage of some, can testify. Altogether,

the South Eastern Union can be congratulated on 'carrying on' so well; in this respect the child setting a good example to the elderly, but we hope not less energetic parent—the Yorkshire Naturalists' Union!

SCIENCE PROGRESS.

The interesting nature of the contents of this Quarterly, edited, and to a large extent written, by Sir Ronald Ross, causes us eagerly to await its appearance. No. 44 contains a variety of contributions, including 'Polymorphism,' by F. D. Chattaway, F.R.S.; 'Osmotic Pressure in Animals and Plants,' by W. R. G. Atkins, Sc.D., and 'The History of Comparative Anatomy, Part I.; a Statistical Analysis of the Literature,' by F. J. Cole, D.Sc., and N. B. Eales. There are also useful summaries of the recent advance in different branches of science, by specialists.

AGE OF THE EARTH.

'Salt and the Age of the Earth,' by G. W. Bulman, deals with Prof. Joly's estimate of the age of the earth by estimating the quantity of salt annually washed into the sea, where it accumulates. Assuming an original saltless ocean, and dividing the amount of salt in the ocean by the amount carried down each year, the age of the earth is estimated to be something like ninety million years. 'Now, if we compare in a broad and general way these salt deposits from the Silurian to the Miocene, it is impossible to suggest that Tertiary oceans were *salter* than the Primary, as they ought to have been. The sea which could give us the salt beds of the Salina group of North America, and those of the Indian salt range, must have contained—one suggests—*at least* as much salt as those of to-day, or of the Miocene which gave the Polish deposits. Nor can we think that our Triassic salt deposits, or the German Permian, came from oceans richer in salt than these Devonian seas which yielded the salt of the salt range.'

SALT WATER AND SALMON.

'And if, as Prof. Joly suggests, the rocks of the earth are having their sodium contents washed out continually, the newer formed deposits should have less than the older. Thus, a river which is cutting its way through *Triassic* rock may be dealing with matter which has had its sodium subject to a like action, say in Carboniferous times. The rivers of to-day must be bringing down *less* sodium than those of the past. Is this possibly why the salmon requires to go to the sea? The river having become *too fresh* for it, the salmon must go for the necessary saltness to the ocean. The eel, also, may have found it impossible to complete its life history in the river's growing scarcity of salt.

SCRATCHES ON FLINTS.

Under the above heading, we have one of the extraordinary effusions by Mr. J. Reid Moir, who repeatedly refers to himself throughout as 'the author.' 'The author' has already had a similar article in *Man.** As any school-boy knows, a freshly broken flint has a very hard face: a flint which has been 'weathered' in the soil for a considerable time acquires a soft white surface, which becomes softer and whiter the longer it is weathered; and naturally, ploughs, etc., passing and repassing over these flints scratch them, the scratches being deeper on the soft 'patina' than on a fresh flint surface.

CAUSE AND EFFECT.

But Mr. Moir holds an 'inquiry'; an 'investigation'; an 'examination': he conducts 'experiments,' and *voilá*, 'these experiments demonstrated clearly that newly broken, sound, unpatinated flint is very hard; that other patinated examples are in a much softer condition.' Also, 'the author' has found that 'it is possible to scratch patinated flints with a steel point, and that these scratches vary in depth and appearance according to the amount of patination . . . . The susceptibility of patinated flint to striation by the pressure of a steel point may perhaps explain the large number of scratched flints found upon the surface of the ground in certain localities.' Marvellous! and if 'the author' were to carry out his enquiry, his examination, his investigation, his experiment further, he would find that flints, when washed about on the beach, become quite rounded and lose all their scratches. And he would no doubt be able to conclude that this was accomplished by the action of the waves. 'Popular Science' is indeed wonderful.

THE COLLECTOR.

Mr. Bruce Cummings writes on 'The Art of Perpetuation,' in which he says, 'the joy of possession, the greed, the vanity and self-aggrandisement of the collector proper, are deftly subverted to the use of the explorer and conservator of knowledge, who, having a weak proprietorial sense—bloodless, anæmic, it must seem to the enthusiastic connoisseur—is satisfied so long as somewhere, by someone, Things are securely saved. The purpose of the arch-conservator—his whole design and the rationale of his art—is to redeem, embalm, dry, cure, salt, pickle, pot every animal, vegetable, and mineral, every stage in the history of the universe from nebular gas or planetismals down to the latest and most insignificant event reported in the newspapers. He would like to treat the globe as the experimental embryologist treats an egg—to preserve it whole in every hour of its development, then section it with a microtome.

* Vol. XIV., No. 11, 1914.

EVOLUTION OF GEOLOGICAL MAPS.

At a recent meeting of the Geological Society of London, Mr. T. Sheppard, M.Sc., F.G.S., gave a lecture on 'British Geological Maps as a Record of the Advance of Geology.' The author pointed out that it often happened changes were indicated upon old topographical maps; consequently, though not strictly 'geological' maps, many old plans and charts were of use in connection with geological enquiry. Examples of maps of the Humber area, dating from Elizabethan times, were exhibited, and showed that great geological changes had taken place; on the one hand, large tracts of land had been denuded and many towns and villages had disappeared, while on the other, new land had been formed, and where once was water, were now large areas of reclaimed land.

EARLY REFERENCES TO GEOLOGY.

It was shown that so long ago as 1595, writers were familiar with the differences in the geological structure of the country, and in 1683 Martin Lister read a paper to the Royal Society, in which he definitely outlined a scheme for 'the mapping of soils and rocks,' mentioning the various kinds occurring in Yorkshire; but his plan was not actually carried out until over a century later. The remarkable sections and plans of Strachey (1719) and Packe (1743) were also described. The first systematic series of maps illustrating the geological features of the counties, was issued in the Reports of the old 'Board of Agriculture,' dating from 1793 to 1822.

SOIL MAPS.

These reports usually contained 'soil maps' of the countries described, upon which chalk, sandstone, limestone, peat, marl, gravel, etc., were shown by colours or shading. These Agricultural Surveys were certainly familiar to William Smith, and doubtless he drew from them information to assist him in his great map of the Geology of the British Islands issued in 1815. One of the earliest serious attempts to prepare geological maps was by Prof. Jameson, who read a paper, in 1805, 'On Colouring Geognostical Maps' (*Wernerian Nat. Hist. Soc.*, Vol. I., published 1811), but the enormous number of complicated signs and symbols which he suggested proved unsuitable for practical mapping, though his colour scheme had many good points in its favour.

THE FIRST GEOLOGICAL MAP.

The first strictly geological map was apparently that in the Society's possession, which was made by W. Smith in 1799, and showed the geological structure of the Bath district. Mr. Sheppard was able to show that this was coloured on a plan originally issued in 'The New Bath Guide' of 1799, which he had succeeded in tracing. The first geological map of England and Wales was a small one, also by Smith, which was presented

by ' The Father of English Geology ' to the Society, when he received the award of the Wollaston Medal in 1831. The history of the various maps and sections published by Smith was given, and two hitherto unknown maps by Smith in the Society's possession were described, and Mr. Sheppard also exhibited another of the Scarborough district, which he had found when cataloguing the Society's maps; this particular map had been lost for over eighty years. Smith's finest piece of work, his map of the Hackness district, dated 1832, apparently has not been seen by any worker since its publication, and the lecturer explained how he had recently been able to trace one or two copies, one of which was exhibited.

LATER MAPS.

The maps of Greenough, of which the Society possessed a very large and valuable collection, published and in manuscript, were then described. Next followed an account of an extraordinary series of coloured maps of England and Wales, and of the British Islands, issued by Arrowsmith, Murchison, Walker, Ramsay, Ravenstein, Knipe, Phillips, Johnstone and others, during the middle of the nineteenth century. The Geological maps of Scotland and Ireland were dealt with, and it was shown that the Society possessed many maps of those countries, some of which were of great value and historical interest. Special reference was made to a manuscript map of Scotland by Necker, dated 1808, which was earlier than Smith's large map of England and Wales. Then followed a description of various privately published maps, such as those of the Bristol Coalfield by Sanders, The London District by Jordan, The Lancashire District by Elias Hall, etc., and finally reference was made to the earlier maps of the Geological Survey. He concluded by referring to the scope of the catalogue of the maps in the Society's possession, which he was preparing, and which contained details of something like three thousand maps.

NATURAL HISTORY IN 1485.

Among many interesting items for sale in a catalogue recently issued by Messrs. W. Heffer & Sons, Cambridge, is a small quarto volume, dated 1485, by J. Publicius. It is entitled ' Oratoriæ artis epitoma, vel quæ brevibus ad consumatum spectant oratorem ex antiquo rhetorum gymnasis,' etc. An illustration from this book is given, which we are permitted to reproduce herewith. The block is interesting, as it represents various animals as they were understood to exist in the fifteenth century. We are not in the habit of having guessing competitions in connection with this journal, otherwise we might have offered a prize for the correct names of the twenty-five animals shewn thereon.

Figura locorũ fictoriũ: cui tres alię cõsiliẽs ꝑ cæntũ locis ingenio cuiuslibet cõpari facillimũ erit.
Erhardus Ratdolt augustẽsis ingenio miro & arte ppolita im/
pressioni mirifice dedit. 1485. pridie calẽ. februarii. Venetiis.

Illustration from 'Oratoriæ artis epitoma,' etc., by J. Publicius. 1485.

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VICTORIA AND ALBERT MUSEUM.

A letter has been sent from the Museums Association, representing the museums and art galleries of the Empire, to the Prime Minister, protesting against the closing of the Victoria and Albert Museum, in whole or part, in order to provide offices for the Board of Education. It is pointed out that, 'apart from all other considerations, it is universally recognised that to secure the supremacy of British trade after the war the standard of artistic excellence in our manufactures must be raised, and this is the special *raison d'être* of the Victoria and Albert Museum. To appropriate extensive portions of the institution for quite other purposes will greatly hamper this vital function of the museum. The loss to the general community from the educational point of view will be heavy, too, and we find it difficult to conceive that the Board of Education, of all Departments, can be a party to the arrangement.' The hope is expressed that it 'may be found possible to provide other and more suitable quarters for the Board, and thus avoid this seriously retrograde step.'

A BUSINESS MUSEUM.

'The Londoner' writes on the subject in the *London Evening News* of May 31st. He truly says:—Some of us are going to be robbed of what pleases us very much: friendly fellow-citizens should stand by us. But there is a better reason for complaint. It is the sacred reason that every Englishman will heed. When I say that, 'after all, Business is Business,' the great heart of the country should be touched. And here is a case where we should say that Business is Business. If we close this Museum and turn it into another nest for those swarming Cuthberts, the civil service clerks, we shall lose money by the change. For South Kensington Museum, if you look at it fairly, is Business: it is a factory: it is an annex to half our factories. South Kensington Museum is there to teach their trades to weavers and joiners and potters, to workers in glass and metal. I do not say that, if we shut all our Museums, we could not make ourselves cups and plates and tables and the rest, things that would serve their purpose in our houses. But be very sure that, if we cut off the workers from the sight of all the beautiful work of the ages gone by, we shall lose all our foreign trade in such wares. We shall give the world-market to the Boche, who is not closing his industrial Museums. So like our officials, is it not, that this thing should be threatened by a Board which calls itself a Board of Education, which is setting about to stop the education of the hand and the eye?'

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A supplement to the *Journal of the Board of Agriculture* dealing with grass land and ploughed land, has been issued, at the price of 4d.

OOLITE GRAINS IN THE UPPER LIAS OF GRANTHAM.

H. PRESTON, F.G.S., AND A. E. TRUEMAN, M.Sc.

OOLITE grains are found occasionally in the limestones of the Lias, as for example, in the ironstone of Frodingham, North Lincolnshire, and in the upper bed of marlstone at Chipping Warden, Northants. They are not, however, of common

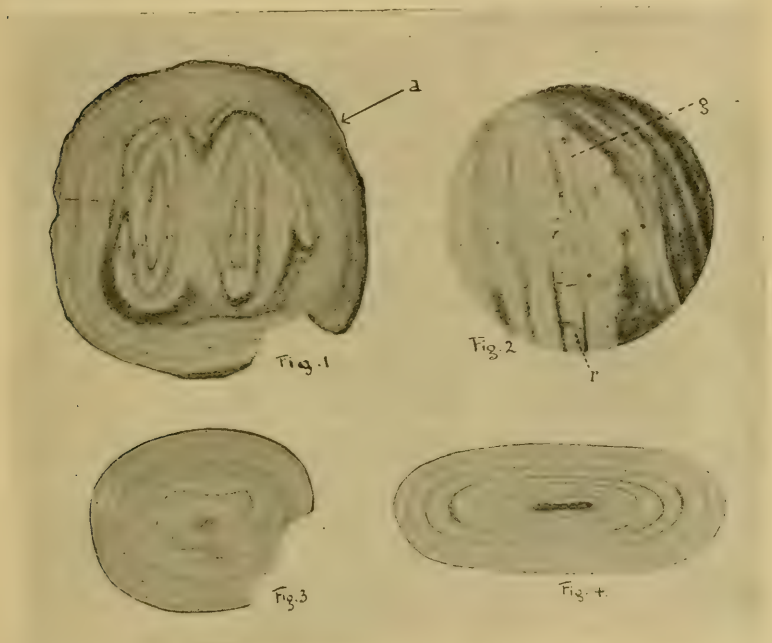

Fig. 1.—Compound grain × 15. Fig. 2.—Enlarged portion of Fig. 1 *a*. (*g* = Tubule. *r* = Radial structure). × 32

Figs. 3, 4.—Typical grains. × 15.

occurrence in the clays of the upper Lias, although they have been recorded in certain beds in Northamptonshire.*

Comparatively large oolite grains are by no means uncommon in a bed of clay, about a foot in thickness, exposed in Rudd's brickyard, south of the railway station, Grantham.†

* B. Thompson, 'Northamptonshire.' *Proc. Geol. Assoc.*, 1910, p. 461.

† H. Preston. *Proc. Geol. Assoc.*, 1905, p. 114.

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The bed is very fossiliferous and contains abundant ammonites of the *falcifer* series, with numerous gastropods and small lamellibranchs (*Nucula hammeri*). The grains are depressed oval in form, varying in length up to 5 mms., but averaging 2·5 mms. The thickness rarely exceeds 1 mm. The grains are scattered throughout the clay, nowhere forming more than one-twentieth of the mass, but they may be readily separated by washing.

Sections of these grains show that they consist of concentric laminæ of calcite surrounding a nucleus of varying character. Little trace of radial structure is seen, but if certain laminæ are examined carefully with a high power they are seen to be made up of radially arranged fibres of calcite: this, according to Cohen,* is one of the forms of oolite most common in British rocks.

Traces of minute tubules are visible in many grains (fig. 2g) and suggest that they are mainly of organic origin. The tubules appear circular in section, with a diameter of about .03 mms., and in many respects resemble those which have been described by Wethered as *Girvanella*. The Grantham oolite grains are somewhat unusual in their flattened form, which seems to be independent of the shape of the nucleus.

The bed we have described probably represents locally a period of slow deposition, probably in shallow water.

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We see from the Report of the Geological Society of London recently to hand, that Mr. C. Davies Sherborn has got to GOT with editing his card catalogue, and it is complete and fitted up to FIT.

In the Transactions of the Entomological Society of London, issued on June 7th, Mr. H. Ling Roth, of the Bankfield Museum, Halifax, has some 'Observations on the Growth and Habits of the Stick Insect, *Carausius morosus* Br., intended as a contribution towards a knowledge of variation in an organism which produces itself by the parthenogenetic method.'

The Executive Committee for the local arrangements in connection with the 1916 meeting of the British Association at Newcastle have submitted a report to the General Committee. The report says the meeting will take a high position among the annual conferences of the Association. The statement of accounts shows that it has been possible to discharge the relatively modest expenditure incurred by the meeting by a call on each of the guarantors of one-fifth of the sum guaranteed by them.

The Memoirs and Proceedings of the Manchester Literary and Philosophical Society, Vol. LX., part 3, include the following memoirs:—'The Geographical Distribution of the Use of Pearls and Pearl-shells,' and 'The Use of Shells for the Purposes of Currency,' both by J. Wilfred Jackson. There is also the Society's report, with a summary of the lectures, etc. This seems to be one of the few societies issuing publications which indicate that the members are still Literary and Philosophical.

* *See* A. Harker, 'Student's Petrology.' 4th Ed., 1908, p. 259.

OCCURRENCE OF BOULDER CLAY AT HUDDERSFIELD.

T. W. WOODHEAD, M.Sc. PH.D.

FOR more than half a century, geologists in the Huddersfield district have been familiar with deposits containing water-worn material, at 100 feet or more above the present level of the river Colne on which the town stands. These deposits have been frequently exposed in excavations for buildings, drains, railway cuttings and borings. It has been customary to regard them as river gravels, and as indicating the former course of the Colne.

During the past two years, excavations made in connection with the extensive works of British Dyes, Ltd., in Huddersfield, have furnished an opportunity of examining very numerous sections covering a large area of the alluvial tract of the Colne, especially around the spur known as Briery Bank, which separates the Colne from Lees Beck. This latter stream, which runs almost due north, drains the Kirkburton valley and is suggestively small for so wide a valley; it bears seven names along its course of seven miles, the last half-mile is known as Lees Beck, and as most of the deposits on its banks, referred to below, occur within this length of the stream, it will be convenient to use the above name only.

At the junction of Lees Beck with the Colne, the alluvium covering the valley floor is three-quarters of a mile wide, as shown on the Geological Survey Map (sheet 246), and it varies in altitude from 160 ft. to 200 ft. O.D.

To account for these deposits, it was presumed that the Colne formerly persued a course from S.W. to N.E., corresponding roughly with the track between the present 275 ft. and 300 ft. contour lines, and that in course of time it had cut its way along the strike of the Lower Coal Measures in an easterly direction, down to its present level. Hence the gently sloping left bank, covered with a wide stretch of alluvium, and the precipitous right bank, where, as at Dalton Bank Plantation, in a distance of less than 400 yards, it rises from 175 ft. to 525 ft., a gradient of 1 in 1·9.

In the Geological Survey, all these deposits are mapped as alluvium, and in no part of the Colne drainage area is there any indication given of deposits belonging either to the first river terrace, or the high level river gravel; but to the N.E., beyond the junction of the Colne with the Calder, extensive river terrace deposits are shown on both banks of the Calder, between Colne Bridge and Dewsbury. A smaller area marked 'old river gravel' is also shown at Kirklees, on the left bank of the Calder.

Considerable attention has been paid to such deposits in

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the upper part of the Calder, and especially to the valley of the Aire, by Jowett and Muff*; while to the south-east, the Don area has been described by Lower Carter.† Up to the present, geologists have paid little attention to the area drained by the Colne and its tributaries. Kendall‡ says, 'The country south of the Calder has been for many years a puzzle to the glacial geologist. Its general aspect is that of an unglaciated region, yet small sporadic patches of unmistakable glacial deposits are scattered at wide intervals through the lower ends of the valleys in the Don and Dearne drainage.'

In the absence of any detailed account of such deposits in the drainage area of the Colne, it may be well to place on record such facts as have come to light during the excavations

Fig. 1.—Junction of Lees Beck with the Colne.

above referred to, and also in similar exposures elsewhere in the neighbourhood.

The principal excavations were on the wide alluvial flat at the end of the spur separating the Colne from Lees Beck. As might be expected in alluvial deposits, these showed great variations in the composition of the beds within short distances.

Fig. 1 shows the confluence of the streams. Lees Beck on the left of the illustration, and the Colne, crossed by a

* Jowett and Muff: 'Glaciation of the Bradford and Keighley District.'—*Proc. Yorks. Geol. Soc.*, 1904-1905.

† W. Lower Carter: 'Glaciation of the Don and Dearne Valleys.' *Proc. Yorks. Geol. Soc.*, 1905.

‡ P. F. Kendall, 'The Glacial Deposits' (of Yorkshire). Victoria County History, York, Vol. I., p. 88, 1907.

foot-bridge, on the right. At this point both streams run over a bed of gravel four feet in thickness.

Fig. 2 shows the deposits on the left bank of Lees Beck in detail. Below the surface soil (seen on the left of the illustration) is six feet of sandy loam resting on gravel. A sudden change occurs at the point where part of the bank is broken away; to the right of the two-foot rule, the loam is only four feet six inches thick, the gravel here being one foot six inches thicker than to the left.

On the opposite (right) bank of Lees Beck, and on the right bank of the Colne, the excavations showed the sands and

Fig. 2.—Sand and gravel, left bank of Lees Beck near junction with the Colne.

gravels to be nine feet six inches to ten feet in thickness and resting on black shale. Near the ox-bow of Lees Beck the following beds were exposed:—

	ft.	*ins.*
Sandy loam ...	4	0
Sandy gravel ...	1	0
Coarse grey gravel...	4	6

The latter bed (charged with sewage which percolated into it from the stream) continues to just beyond the confluence, and here it contained a number of large water-worn boulders. At this point the bed thins out and merges into a bed of fine grey mud one foot in thickness, resting on a bed of

ochreous gravel ten inches thick. This grey gravel did not appear in sections on the left bank of the Colne. The colours of the gravel vary from rich ochreous yellow to dark slaty grey, probably indicating varying degrees of oxidation, as the materials are very similar in type. On the left bank of the Colne, near the foot-bridge, one section twelve feet in thickness did not reach the bottom of the gravels. The section showed the following layers :—

	ft.	*ins.*
Fine sandy loam ...	1	6
Coarse ,, ...	1	6
Sandy gravel ...	0	6
Coarse sand ...	1	6
Ochreous sandy gravel	1	0
Coarse gravel ...	6	0

Most of the excavations here were confined to the surface layer four to five feet in thickness, varying from sandy loam to coarse sand and fine gravel, often current bedded. In the latter, at two feet from the surface, was found the left scapula of an ox, the species of which has not yet been determined. In the alluvium in the neighbourhood of Huddersfield, ox bones have frequently been found and they are usually referred to *Bos primigenius*, but I know of no instance where the species has been determined with certainty.

The gravels appear to increase in thickness further to the north, e.g., at the New Peace Pit, five hundred yards to the north-west from the confluence of the streams, the depth is seventeen feet six inches. On the left bank of the Canal near Colne Bridge, an excavation, 18 feet deep, showed the following deposits :—

	ft.	*ins.*
Surface Soil	1	0
Sandy Clay with fragmented Shale, and a few Sandstone boulders ...	3	0
Dirty loam with numerous boulders	12	0

The latter bed was aptly described by the navvies as ' muck and stones.' Some of the boulders here were of large size, being one to two tons in weight. The bottom of the deposit was not reached.

With the exception of one or two doubtful finds, all the deposits exposed in these sections are composed of local rocks viz. :—Lower Coal-Measure and Millstone Grit Sandstones and Shales. Water-worn boulders of Ganister, containing Stigmarian rootlets, are abundant.

Excavations made at higher levels, however, revealed deposits of a different kind. The most interesting were on the eastern slope of the spur separating the Colne from Lees

Beck. Before excavations commenced, suspicious-looking deposits were exposed in the natural sections of the left bank of Lees Beck, where a bed of ' gravel ' was seen resting upon a high bank of black faulted shale ; one section showed this deposit filling a V-shaped hollow, ploughed out of the shale, ten feet or more above the stream bed.

Higher up on the spur good sections of this deposit were

Fig. 3.—Pipe track from Lees Beck to Dalton Gardens Reservoir, showing boulder clay.

exposed in excavating for the foundations of the works laboratory. This proved to be stiff yellowish clay merging into a sandy clay, with both water-worn and angular stones of all shapes and sizes, indiscriminately embedded in it. Frequent globular pockets occurred, filled with fragments of shale and coal, the filling material readily crumbling away, leaving a smooth lining with a greyish white incrustation.

This deposit covers the end of the spur, and can be traced in a southerly direction (up stream) to Sand Ings, nearly

half-a-mile away. Fortunately, a pipe line was cut at right angles to the spur, from Lees Beck to the hill-top at Dalton Gardens (Fig. 3), this enabled the deposit to be examined more carefully. Its upward distribution proved to extend to the two hundred feet contour line, *i.e.*, about thirty feet above the level of the stream bed. The lower zone contained many water-worn and irregular stones, some of large size (a ton or more in weight), and among these were several having undoubted ice scratches. One of these is shown in Fig. 4. A little higher up the slope, the excavation revealed a bed four to five feet thick, of stiff, tenacious, blue-grey clay, free from boulders, and this was overlaid by a bed of yellow clay from two to four feet in thickness, thinning out about the two hundred feet contour line. These sections were seen by Mr. A. Gilligan, and later by Prof. P. F. Kendall, and both agreed that the deposits were typical boulder clay. Another interesting section was exposed near the commencement of this pipe line, when making a diversion of Lees Beck. Here it was found that the boulder clay was resting upon current-bedded gravels, this is shown in the photograph (Fig. 5).

In the curious depression known as Sand Ings, about half-a-mile further up the valley, the excavations revealed a thick deposit of clay, free from boulders, viz. :—An upper layer, fourteen feet thick, of brown clay, resting upon a layer, four to five feet thick, of stiff blue clay. The little stream which drains Sand Ings pursues a normal course to the east until it approaches the bottom of the valley, then it turns sharply to the south (up the main valley) before joining Lees Beck ! Features very similar to those described at Dalton Lees and the spur above, are repeated at Kirkheaton and Mill Hill (also in the Kirkburton valley). Between the railway and Mill Hill is a wide stretch of alluvium through which the Beck meanders. In May of last year, a pipe line was cut through the alluvium from Messrs. Jarmain's works to Lees Beck, the deepest part of which showed :—

	ft.	*ins.*
Soil	1	3
Sandy loam ...	3	0
Ochreous stony gravel	4	3
Blue Clay	1	0
Grey sandy gravel	2	0

but the bottom of the gravel was not reached.*

South-west of Messrs. Jarmain's works, the beck makes a deep horse-shoe bend, and on its left bank is cutting into the steep slope of Mill Hill, on which the sanatorium is built.

*Mr. G. S. Jarmain kindly informs me that at a borehole in their works, the depth of gravel was 13 feet.

Fig. 4.—Ice-scratched and polished sandstone boulder, found in the pipe track, Briery Bank.

Fig 5.—Boulder clay resting on current-bedded gravel in diverted course of Lees Beck.

Here a section of sandy boulder clay is exposed, and it may be traced over the hill, which is about twenty-one feet above the bed of the stream. The ploughed fields, and also the drains, in the sanatorium grounds, reveal abundant traces of boulder clay, and the constituents examined agree with those found on Briery Bank. It was in this neighbourhood that a horn was found in 1882, supposed to be that of *Bos primigenius* (see *The Naturalist*, 1882, p. 150).

At Mill Hill, the beck receives a tributary from Whitley; in this, near Rods Mill Dam, at 500-550 feet, boulder clay is again met with and a little further north, near Houses Hill,

Fig. 6.—Boulder clay resting on a concave bed of Lower Coal Measure shale, Hillhouse.

it has recently been exposed in several sections at 400-450 feet.

Near Fenay Bridge is another tributary valley drained by the Rushfield Dyke—the Mollicar Valley—and near Fenay Hall and Rushfield, clays and gravels occur which suggest a further extension of this deposit, but satisfactory sections have not yet been exposed and examined.

Continuing along the main valley, good sections may be seen at the Spa Green Brick Works, Cownes; and a mile further, opposite the junction with the Woodsome road, the

site of an old excavation is marked 'gravel pit' on the early survey maps. Beyond Kirkburton, the valley forms a picturesque wooded gorge to Thunder Bridge where it is joined by a tributary from Fulstone. Near the head of this stream glacial deposits are again indicated between Ellen Spring and Wood End Wood at 625 feet, and in the bed of the stream at Ellen Spring, I found a boulder of Carboniferous Limestone but whether it had been derived from the deposits on the stream bank or not is uncertain.

In the main valley of the Colne, on the gently sloping left bank, deposits occur, spread over a wide area in the centre of Huddersfield and to the north-east, which have been known for many years, and been frequently revealed in excavations and borings, and are generally spoken of as the 'old river bed.' About twenty-three years ago, I remember visiting the railway cutting at Hillhouse siding in company with the late Edward Brooke, F.G.S., and other local geologists, and the fine section then exposed was regarded as river deposit. Excellent sections of the same bed may now be seen in the Huddersfield Brick and Tile Works in the vicinity, and they prove to be undoubtedly boulder clay. Mr. Gilligan has been good enough to examine these along with me and he agrees as to their glacial origin. In this material large blocks of sandstone occur, some weighing one to two tons. One section (Fig. 6) shows what is either a fold in the shales filled with boulder clay, or more probably, the latter, in moving over the surface, has ploughed out a concave bed. This boulder clay has been traced from Chapel Hill (299 ft.) where the bed is eight feet in thickness, to Queen Street South, Shore Head, Kirkgate, Hillhouse, Fartown Green, Birkby* and Grimscar; at the latter place interesting sections are exposed at a height of nearly four hundred feet. It is continued beyond Sheepridge and Woodhouse to Bradley, where good sections may be seen in the railway cutting and in numerous excavations at Messrs. L. B. Holliday's Works. From here it can be traced with little interruption to Colne Bridge and the junction with the Calder.

At Kirklees, on the left bank of the Calder, a bed of gravel occurs at Castle Hill, the highest point in the park (300 ft.). The gravels cover an oval patch of ground a quarter of a mile long, and on this is Robin Hood's grave, and also the remains of a Roman fort. Good sections are seen in the gravel pit here and Fig. 7 shows one of them. These gravels have been seen by Mr. Gilligan, and we have compared them with the gravels at Rothwell Haigh, and he agrees they should be placed in the same category. Their origin is very difficult to

* Recorded by S. L. Mosley, in the *Huddersfield Examiner Supp.*, May 30th, 1914.

explain; the Geological Survey (sheet 246) mark them 'old river gravel.' Probably they were transported by ice, and later, redistributed to some extent by water, as indicated by the evidence of current bedding in them. The western slope of Castle Hill is precipitous, and a hundred and fifty feet below runs the Calder. A small piece of chert was found in the

Fig. 7.—Section in gravel pit, Kirklees Park.

Kirklees gravels during our visit, otherwise the material examined was derived from local rocks.

In the Holme Valley, interesting sections have been recently exposed near West Wood, Honley (450 feet), where boulder clay 4-5 feet in thickness is seen resting on the shales in the works of the Meltham Silica Fire Brick Co. A little to the north east of this, on the slopes of Lud Hill at 650 feet, large mounds occur which are very suggestive of glacial deposits, but these have not yet been excavated. Probable connecting links between Honley and the Colne are the surface deposits at

Newsome (525 feet), Primrose Hill (425 feet), and Longley Park (225 feet).

It has been customary to regard the district south of the Aire as practically unglaciated. Concerning the Calder valley Kendall remarks,* 'So far as can be ascertained, no native glacier occupied the valley, though the occurrence of boulder clay, containing rocks of the Lake District, at the gasworks at Todmorden, may be taken to prove the protrusion of a glacier lobe down to that point. Through the rest of Calderdale gravels containing similar foreign stones occur in the floor of the valley at least as far as Thornes, below Wakefield.' But the more these deposits are examined, and especially the remains of boulder clay on the slopes high above the valley floor, the more does it become probable that the ice extended much further down the valley.

The deposits above recorded as occurring in the neighbourhood of Huddersfield, when plotted on a map, strongly suggest morainic remains, not only in the valley of the Colne, but of its tributaries as well, viz., the Holme and the Kirkburton valleys. These deposits also enable us to connect the story of glaciation between the Aire, as described by Jowett and Muff, and the Don area studied by Lower Carter, with that of Rosendale more recently described by Jowett.† Jowett showed how the great ice sheet from the Irish Sea, joined by that from the Clyde, crossed the plain of Lancashire, and invading the Pennines, reached the ridge and forced a plug of ice into the head of Calderdale. He indicates a fringe of local Drift, backed by north-western Drift, down to Buckstones at the head of the Colne. This was the limit of the area he described. This sea of ice, however, extended further south, from Rochdale to Oldham, and also invaded and filled the Saddleworth and Greenfield valleys. Portions of these deposits are indicated on the Drift map of this district on sheet 88 S.W. (Huddersfield). There are also evidences in the clays beneath the peat, of an extension of the ice along the Stanedge, which involves the head waters of the Colne.

Is it too bold a suggestion, that during the period of maximum extension of the ice, when—to use a favourite expression with glacialists—'the ice over-rode everything,' it may well have crossed the head of the Colne, and also the Holme, and made its way down these pre-glacial valleys?

Before reaching the Pennine ridge, the western ice, for a distance of about thirty miles, had to pass over the outcrops of beds of the Lower Coal Measures and Millstone Grits, and

* *Ibid*, p. 88.

† A. Jowett: 'Glacial Geology of East Lancashire.' *Quarterly Journal Geol. Soc.*, 1914, pp. 199-228.

would thus deposit in these Yorkshire valleys, rocks of the same formations as those which the valleys themselves are composed.

The deposits already found suggest that the ice entered the cirque at the head of the Holme, and passing eastward, overrode the spur at Wooldale, entered the Valley at New Mill, then ascending the slope to Fulstone, passed through the gap (650 feet) between Haw Cliffe (950 feet) and Snowgate Head (900 feet) and so down the Kirkburton Valley. A branch passing down the Holme might have given off a lobe which, ascending the slopes of Lud Hill, passed over Farnley Hey (675 feet), entered the Mollicar Valley and joined the main flow at Woodsome Mill ; from thence its course would be to Fenay Bridge and Dalton Lees, where it would merge with the flow coming down the Valley of the Colne. Such a course would account for the deposits as above recorded, and the hypothesis will serve to indicate the lines along which further evidence may profitably be sought.

In the papers above referred to by Jowett and Muff and Lower Carter, another problem involving this area is briefly dealt with. These geologists carry the lateral moraine of the Aire glacier southwards across the Calder at Horbury, and if Carter's view is correct, the embankment was high enough to hold up the Calder drainage to such an extent that its overflow channel near Wooley Edge was, at its lowest point, four hundred and five feet above sea level.

The lake also received part of the Aire drainage, which made its way along a pair of successive channels near Wibsey, and entered the lake at the head of the Spen Valley.

A dam of the kind suggested would produce a lake of truly fine dimensions, concerning which, however, some geologists are sceptical. If the area which would be covered were indicated on a map, ' Lake Calderdale ' would be seen to extend from Horbury to Todmorden (about 22 miles), and would submerge much of the Spen Valley, also Batley, Dewsbury, Ravensthorpe, Mirfield, Huddersfield, Brighouse, Elland, Sowerby Bridge, Hebden Bridge and the intervening lowlands.

One of the difficulties raised against the former existence of such a lake, is the absence of records of laminated clay, so characteristic of other lake deposits. Although searched for in the sections recently exposed, I have not found any clay of this type. Those who have doubts about this lake, however, agree that the Humber drainage was blocked by the North Sea ice to a height of at least two hundred and seventy five feet. The lake which would thus be formed would include much of the area of ' Lake Calderdale,' still laminated clays are apparently absent ! But if the boulder clay is so obscured and fragmentary as to have escaped the notice of glacialists,

we need not wonder at the difficulty of finding such an easily denuded deposit as laminated clay on the precipitous slopes of the Calder and Colne, especially when we consider how few relatively, are the areas which have been exposed and examined. Foreign materials, Granite, Whinstone, etc., have been reported from the Colne and Holme valleys, and though these did not receive expert examination, it is probable that part of the north-western Drift found its way into these valleys, and further investigation may reveal its presence.

Notwithstanding the fragmentary character of the evidence, it is sufficient to enable us to suggest a probable explanation of the deposits as we now find them.

1. They probably belong to an early period of the Ice Age.

2. The valleys were perhaps occupied by ice for a relatively short period.

3. The direction of the ice, and the rocks it passed over, would account for the deposits being almost entirely composed of rocks of the Millstone Grits and Lower Coal Measures.

4. The valleys were pre-glacial in origin, and already contained an alluvium with numerous water-worn pebbles and boulders of Grit, Sandstone, Ironstone and Ganister.

5. The long period during which the deposits have been exposed to denudation, on the sides of valleys with precipitous slopes, may well account for its present fragmentary character, especially where the matrix was a sandy clay.

6. If in later glacial times a lake was formed, the wash of its shores would tend towards further denudation and redistribution of the material.

7. The lake period was probably a short one, and laminated clays, perhaps at no time in abundance, may have since been obliterated, or remain undiscovered.

8. Before the ice receded from the Pennine ridge, the rush of melt-waters down these valleys might well have been responsible for some of the features which render them of peculiar interest.

9. Evidences of super-deepening are not so pronounced as in the valley of the Calder, which indicate that the present land surface is two hundred feet lower than in glacial times. In no part of the Colne drainage have the gravels been found at so great a depth as in the Calder, but some of the tributaries of the Colne, which drop steeply into the main valley, may be in part thus accounted for. The gorge-like character of the Colne, expecially where the river breaks through the Rough Rock at Longroyd Bridge before entering the lower Coal Measures, is very suggestive. Similarly, but on a smaller scale, the Meltham Brook has cut through the Rough Rock at the 'Mag' before joining the Holme.

10. It seems probable that the broad band of alluvium

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which now covers our valley floors, is in some measure at least redistributed boulder clay, and this boulder clay in turn, is in part the ice-borne sand and gravel of pre-glacial rivers.

It is evident that more extended research will reveal the presence of remains of the Glacial Period in these valleys to a much greater extent than has formerly been supposed.

In conclusion, I wish to record my indebtedness to Mr. W. H. Sikes, who has taken much interest in the deposits, and has also been at much pains to secure a large series of photographs of the sections exposed, including those used in illustrating this paper. Also to Prof P. F. Kendall and Mr. A. Gilligan, for examining some of the sections, and with whom I have had many helpful discussions on the problems involved. I also desire to thank the directors of British Dyes, Ltd., and Mr. Nicholson of the Huddersfield Brick and Tile Co., for so freely granting facilities to visit their works.

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ABNORMAL SPIDERS.

WM. FALCONER,
Slaithwaite, Huddersfield.

SINCE writing on this subject,* I have been struck by the frequency with which spiders have occurred to me with one or both congeries of palpal organs imperfectly developed or altogether wanting. These organs,† appendages confined to the male sex, are not of vital function, being employed only in the act of generation, so that wanting them, those afflicted, perforce having to remain bachelors, are of no account in the propagation of the race. Otherwise they do not seem affected in any other way, the individuals seen being well-grown and coloured, active and vigorous. The cause of the defect is obscure, but may have resulted congenitally from some eccentricity in the protoplasm of the germ or from failure to complete successfully an early moulting process in this part of its organism, or other accident. As the palpal organs are only fully developed and disclosed in the adult, they cannot be replaced by new growths during a moult as is the case with lost limbs, so that the condition is permanent.

Instances of mal-growth are, of course, from their very nature, easily observable, while total loss in course of development may be at once distinguished from that due to violence by the smooth unbroken surface of the exposed ends of the palps, much in the same way as the internal lacunæ of water plants

* Vide *The Naturalist*, May 1910, pp. 199-203, and June 1910, pp. 229-232.
† For figures of such organs see *The Naturalist*, Oct. 1912, Pl. XV., figs. 1-7 and 21.

may be discerned from the similar cavities in the stems of horsetails, grasses, etc. The examples noted have not belonged to, or been more plentiful in, one group of spiders than in another; an example of total suppression of palpal organs in *Epeira sturmii* Hahn (East Riding, T. Stainforth, 1916) and another of mal-development of the same in a *Clubiona terrestris* Westr. (near Huddersfield, June 1917) being far apart in a classificatory sense.

One or two cases of so-called hermaphroditism, that is of the same spider possessing one palp of the male type and the other of the female type as well as the female organ (both kinds of genitalia more or less defective), have also occurred. From examples noted by observers at different times in various countries, the condition has been thought to be a peculiarity of the sub-family *Linyphiinæ*, but in June, 1913, at Hebden Bridge, I took a *Neon reticulatus* Bl., in which the state was well exemplified, the right palp only being of the male type, but as usual neither this nor the female vulva perfect.

It is, I think, to be expected that the condition will occur also in other sections, rarely, however, in most and only comparatively more commonly in the *Linyphiinæ*, which constitute, both as regards genera and species, by far the greater bulk of our spider population.

With regard to other forms of abnormality mentioned (*loc. cit.*) partial blindness by obliteration or imperfect development of one or more eyes keeps recurring, but the most frequent of all is that of deep wide longitudinal channels in the soft substance of the abdomen, above or below.

Finally, a kind of superficial deviation from rule new to me is furnished by a spider taken in Cumberland, fully two-thirds of its ocular area being, if I may use a botanical term, etiolated, with an appreciable effect on the formation of the eyes affected.

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We have received the *Eighty-third Annual Report of the Bootham School, York, Natural History Society*, which bears evidence that this famous school still keeps up its reputation for encouraging the study of nature among its scholars.

A recent writer in the *Yorkshire Weekly Post* gave a description of the colony of the Black-headed Gulls on Skipworth Common. In this he referred to the 'falling off in numbers which is extraordinary and unaccountable. Since the season began, in the first week of May, the keeper has sent about 300 eggs to York, 360 to Bradford, and there were 140 in hand. A Saturday's collection numbered 70 or 80, so that there is a total of say 900 eggs; and this, he estimates, is about half the usual yield. Normally, under protection, there are fully 500 pairs of gulls on the Common; to-day there are not more than 200. On Washdyke, for example,—a deep, extensive pond, thick with reeds, and an ideal breeding place—there used to be 100 nests; there is not one to be found this season. The adjacent dykes, where he used to see 50 or 60 nests, contain only one to-day, from which three eggs have been taken.'

DREISSENSIA POLYMORPHA, PALLAS.

HANS SCHLESCH,
Hellerup, Denmark.

Dreissensia polymorpha is one of the few species of which it is possible to trace the introduction into the parts of Europe in which it occurs. According to Mousson and v. Martens its original home is S. E. Europe, as it is found in small lakes isolated from rivers and canals in Rumelia and Albania, and Andrussov records it from the tertiary formations near Bejuk-Schor and Balachany in Caucasia*. *Dreissensia polymorpha* was first found by Pallas in 1768 in the lower parts of the Ural River†) and it was found in the Wolga in 1780. It is interesting to note that this species lives as well in salt as in freshwater, and on account of its resemblance to *Mytilus* Pallas named it *M. polymorphus*. It inhabits also the Caspian Sea, Lake Aral, etc. From these parts of Europe it has spread over the greater part of Europe, except Scandinavia, Spain, Portugal, Italy and Greece, fastening itself by its byssus to ships, etc., and proceeding up the rivers, has passed from one river valley to another, until it reached the Baltic. On 2nd November, 1824, Sowerby exhibited in the Linnean Society, the first British specimens, found in the London Docks. In 1825 it was recorded from Frische—and Kurische Haff, in 1826 in the Rhine near Leyden, in 1827-29 in Havel near Berlin ; in 1835, in the Eidern in Holstein and 1843, by Mörch from Copenhagen. From Holland, it has spread over Belgium and France and in Germany down the Rhine, as far as Basel, and the Main river, and by the Danube—Main Canal into the Danube to Regensburg.

Hazay records *Dreissensia polymorpha* from Budapest, in 1824, but probably it was carried by ships from the Black Sea. At the present time, it probably inhabits the Danube along its whole length. An example of an isolated locality in which it has suddenly appeared, is Lake Furesö, a few miles north of Copenhagen. Furesö is certainly the best studied locality in Denmark since the days of the celebrated Danish malacologist, Otto Friederich Müller, who did much collecting there, but it was found there first only a few years ago, and in abundance. In April, 1835, Prof. van Beneden named this species *Dreissensia*, in honour of the apothecary, Dreissens, who obtained the first specimens in the Maastricht Canal; at the same time Prof. Rossmässler named it *Trichogonia*, but as van Beneden also described the animal, the name *Dreissensia* is to be used.

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* A portion with fossil *Dreissensia* is to be seen in the Hull Museum.

† Reise durch versch. Prov. des Russ. Reich's 1771, I., p. 375.

In Memoriam.

SAMUEL MARGERISON.

THE death took place in Leeds on June 8th of Mr. Samuel Margerison, for many years one of the best known and most highly respected residents of Calverley. Mr. Margerison, who was in his sixtieth year and was unmarried, had been keen on assisting his country in the war, and had been working in a Leeds munition factory. He was taken ill a week ago with pleurisy and bronchitis, but despite the attention of Dr. Arnold Lees, pneumonia developed with fatal results.

Mr. Margerison was the son of the late James Margerison of Calverley, and was a member of a family which has been resident in the parish for some centuries. For several generations, the family has been associated with the timber trade, and Samuel Margerison, succeeding his father in the business, specialised principally in English oak. Much timber collected by him from various parts of the country is now in buildings of historic fame, and when Mr. Margerison, some twenty years ago, erected at Calverley his beautiful house, Grey Gables, for which he acted as his own architect and which he decorated with his own hand, he filled the place with fine panelling, some of it historic. It included for instance the panelling of the historic ' murder room ' of the scene of the ' Calverley Tragedy ' of pseudo-Shakespearian fame. To the scientific and economic study of timber, Mr. Margerison made important contribution, and he was a vice-president of the British Timber Trade Association. For a considerable number of years he paid great attention to the subject of timber-planting, and he came to be prominent among the expert foresters in the country. He was called upon to give evidence to the Royal Commission on Afforestation, and he acted as adviser to many owners of large estates and to several corporations and other public bodies. Perhaps the most interesting enterprise with which he was associated in this direction was the afforestation of the area adjacent to the Leeds waterworks reservoirs in the Upper Washburn. The idea of planting waterworks catchment areas with trees met with a good deal of opposition from some waterworks engineers, but Mr. Margerison, with pen and voice, urged the desirability of the project, and his advice, with that of other experts, prevailed with the Leeds authority. It must be, of course, years before the Leeds corporation reaps the financial reward of their enterprise in afforesting slopes surrounding the Fewston and Swinsty reservoirs, but there is already assurance that the experiment, as it was regarded by many at the time, will prove eminently successful.

A man of enormous energy of mind, Mr. Margerison made

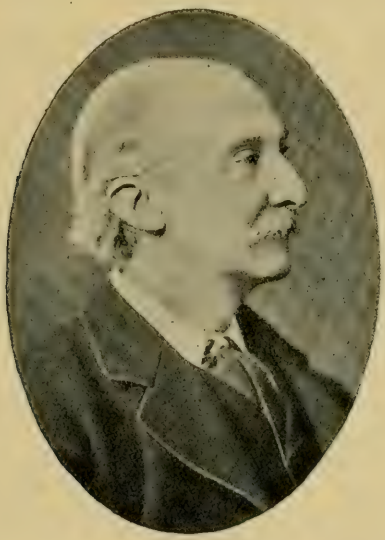
for many years a practice of concentrating his studies for a definite time upon some specific branch until he had mastered it. As a consequence he might be considered a specialist in an exceedingly wide range of studies. He was one of the best-informed naturalists in the county. A good general knowledge of even the lesser-known branches of botany was the basis of some studies on the colonising capacity of different wild plants and their ability to dominate others in the struggle for existence, studies which were carried out in some old quarries in Calverley Woods. His book on this subject attracted much notice from botanists in many parts of the country as an excellent piece of original work. He was keenly interested in Alpine plants, and his garden at Calverley became one of the show-places of the district, and he was never happier than when entertaining the members of the Leeds and Bradford natural history societies, who were long wont to pay him an annual visit to see his treasures under his own guidance. It was a great grief to him when unsuccessful investments compelled him to give up to others the house and grounds into which he had put so much affectionate labour. He was one of the designers of the Bradford Botanical Garden in Lister Park, and was a member of the advisory committee appointed by the Corporation in connection with the garden.

It was as an antiquary that he did most enduring work. He was little more than a youth when he undertook a transcription of the parish registers of his native place, which he published in three volumes. He was an early member of both the Bradford Historical and Antiquarian Society and of the Thoresby Society, and contributed to the publications of both societies. For the Thoresby Society, he transcribed, and in conjunction with Mr. Paley Baildon edited, the early charters of the Calverley family, which are now in the British Museum. This produced a stout volume full of important historical information, and the enterprise was completed by the transcription and the publication—through the Surtees Society—of the memorandum-book and diaries of the builder of Esholt Hall—another important local ducument. Beside these Mr. Margerison collected much historical information and made many drawings for a history of Calverley, which, however, he was fated never to write. He was an excellent photographer and lantern-slide maker, and the lecture which he frequently gave in various parts of the country on ' What to See in an Old Church," did much to popularise a knowledge of church-antiquities. He was a frequent contributor to *The Naturalist* and *The Bradford Scientific Journal* and was a life member of the Yorkshire Naturalists' Union. He was buried at Calverley Church, and Yorkshire Naturalists were well represented at the funeral.—H.E.W.

In Memoriam.

T. McKENNY HUGHES, M.A., F.R.S., F.G.S., F.S.A.

We much regret to add the name of still another veteran worker to the list we have recently published of those who have left us after giving a useful life in the interests of geological science. Prof. T. McKenny Hughes was 85 years of age, and was able to write and carry out his work almost to the end. For many years he was the Woodwardian Professor of Geology



at Cambridge. As an Archæologist, too, he had a considerable reputation, especially in those branches bordering on geological science.

Yorkshire was particularly favoured with his attentions, and so long ago as 1867 he had some 'Notes on the Break between the Upper and Lower Silurian Rocks of the Lake District, as seen between Kirkby Lonsdale and Malham, near Settle,' in *The Geological Magazine*, Vol. IV., p. 346-356. In 1868 he had some 'Notes on the Geology of Parts of Yorkshire and Westmorland' in the *Proceedings of the Yorkshire Geological Society*, Vol. IV., p. 565-577. This Society has been regularly favoured with the results of his work ever since; his valuable series of papers on 'Ingleborough,' published in recent years, forming an exceptionally complete account of the interesting geological features of the most remarkable

of our Yorkshire mountains. His other contributions to Yorkshire Geology includes :—

The Geology of the Country around Kendal, Sedbergh, Bowness and Tebay. (With W. T. Aveline). *Geological Survey Memoir*, 8vo, London, 1872.

On a Series of Fragments of Chert collected below a chert-bearing Limestone in Yorkshire [Ingleborough]. *Rep. Brit. Assoc.*, for 1872, sections p. 189, 1873.

Exploration of Cave Ha, near Giggleswick, Settle, Yorkshire. *Journ. Anthrop. Inst.*, Vol. III., No. 3, pp. 383-287, 1874.

On the Evidence for Preglacial Man. *Proc. Cambridge Phil. Soc.* Vol. III., Pt. 1, pp. 16-17, 1876.

On some Perched Blocks and Associated Phenomena [Norber Brow, etc.]. *Quart. Journ. Geol. Soc.*, Vol. XLII., pp. 527-539. *Geol. Mag.*, December, Vol. III., pp. 375-376, 1886.

On the Drifts of the Vale of Clwyd and their Relation to the Caves and Cave Deposits. *Quart. Journ. Geol. Soc.*, Vol. XLIII., pp. 73-120, 1887.

On Caves. [Ingleborough]. *Journ. Trans. Vict. Inst.*, Vol. XXI., pp. 77-106. 1888.

Caves and Cave Deposits [Ingleborough Caves]. *Proc. Chester Soc. Nat. Sci.* No. 4, pp. 141 et. seq. (see Review in *Naturalist*, pp. 241-2), 1894.

Ingleborough, Pt. 1, Physical Geography. *Proc. Yorks. Geol. Soc.*, Vol. XIV., pp. 125-150, 1901.

Part 2, Stratigraphy. *loc. cit.*, Vol. XIV., pp. 323-343, 1902.

Part 2 [should be part 3]. Stratigraphy (continued). *loc. cit.*, Vol. XV., pp. 351-371. 1906.

Part 4. Stratigraphy and Palæontology of the Siurian. *loc. cit.*, Vol. XVI., pp. 45-74.

Pt. 5, Devonian and Carboniferous, *ibid.*, pp. 177-196, 1907.

Part 6. The Carboniferous Rocks (with plans, sections, etc., and lists of organic remains). *loc. cit.*, Vol. XVI., pp. 253-320, 1909.

He was also responsible for much of the geological work on the maps of Yorkshire issued by the Geological Survey.

Even so recently as a few months ago he published some work on the gravels of East Anglia, which was duly noticed in the columns of *The Naturalist*.

Prof. McKenny Hughes made a special study of the contents of the caves in various parts of this country, and prepared many monographs on the subject. An account of his life's work with portrait and list of memoirs appears in *The Geological Magazine* for January, 1906 in the 'Eminent Living Geologists' series.—T.S.

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An extraordinary sight was witnessed at Horncastle on Saturday evening, June 16th. At the back of the Court House are three brick-clay pits, now disused, two of which are full of water and used by the Angling Club. In the smaller pit the water has diminished of late, owing to the dry weather. The top of the water was alive with eels, and around the sides they were in bunches, while many had actually got on to the bank side. The news quickly spread, and within a short time men had gathered and enjoyed a rich harvest. It is estimated that quite 40 stone of eels were obtained on Saturday evening and about 100lb. on Sunday, the majority being between ½lb. and 2lb. in weight.

FIELD NOTES.

MOLLUSCA.

***Limnea stagnalis* introduced into Cumberland.**—This species has no place in any of the lists of Cumberland Mollusca that I have seen, nor have I ever found it myself. In July, 1914, I brought half a dozen fine adults and a quantity of spawn from Wanstead Park in Essex, and put them down in some ponds on the old rifle range at Cummersdale near Carlisle. On May 19th last, while working these ponds for Water Beetles, I netted two nice specimens of *L. stagnalis*. I am recording it now to explain its occurrence here in case anyone 'discovers' it.—JAS MURRAY, 2 Balfour Road, Carlisle.

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HYMENOPTERA.

May-blobs poisoning Bees.—While in Deffer Wood, near Skelmanthorpe, on the morning of May 13th, my attention was attracted by the brilliance of the flowers of a small bed of May-blobs, *Caltha palustris*. I found the flowers had also attracted a number of humble bees, with disastrous results. There were eight *Bombus terrestris* and four *B. venustus* on the flowers, all either dead or dying. One *terrestris*, not so helpless as her sisters, was feebly thrusting her tongue amongst the stamens, and continued doing so for a few minutes, but eventually became listless and as defenceless as the rest. When I left, four of the bees were quite dead. A few honey bees, *Apis mellifica*, were also working the flowers, but they were never seen to use their tongues, they seemed to be only collecting pollen by walking about over the anthers, golden masses of which were packed between the upright hairs on the thighs of the hind-legs. They suffered no harm. Listless humble bees are quite common objects on the flowers of thistles and scabious in the autumn, but then the purpose of their lives has been accomplished; but in this case, the insects were all young queens working to get a home together for their progeny.

The weather at the time was hot and close, and on the preceding and following nights, heavy thunderstorms passed over the district. In striking contrast to last season, humble bees are abundant this season; the common wasp, however, is scarce. The charming little bee, *Andrena fulva*, which I have only once before noted in this district, has been a constant visitor at a few gooseberry bushes in the garden during the last few days.—B. MORLEY, Skelmanthorpe, May 16th, 1917.

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Mr. F. H. Day, of 26 Currock Terrace, Carlisle, is endeavouring to draw up a list of Westmorland coleoptera, and would be glad if any readers of *The Naturalist*, who have records for the county, would communicate with him.

NEWS FROM THE MAGAZINES.

The Entomologist for June has an illustrated note on the 'Destruction of Wheat by Wasps,' by F. W. Frohawk.

No. 66 of *The Scottish Naturalist* contains a lengthy paper on 'A Chair of Economic Ornithology,' by W. Berry.

The Scottish Naturalist for May contains a useful 'Check-List of the British Terrestrial Isopoda (Woodlice),' by Walter E. Collinge.

The New Phytologist (double number) Vol. XVI., Nos. 1 and 2, contains 'Observations on the Evolution of Branching in the Filicales,' by Birbai Sahni.

In *The Entomologist's Monthly Magazine* for June, Mr. H. Britton describes a new species of Coleoptera, *Ptilium asperum*. It was taken in an old squirrel's drey in Cumberland.

In the *Selborne Magazine* for May, it is recorded that a male Sparrow Hawk, while attempting to carry off a chicken from a hen-coop near a Somerset Rectory, was killed by the old hen.

The *Transactions of the Manchester Geological and Mining Society*, Vol. 35, pt. 2, has an interesting paper dealing with Old Colliery Machinery, by Mr. W. T. Anderson. It is well illustrated.

The Lancashire and Cheshire Naturalist for May contains the Third Annual Report of the Lancashire and Cheshire Fauna Committee; Mr. R. Standen writes on Woodlice, and there are numerous shorter notes.

The *Report of the Corresponding Societies' Committee of the British Association* contains a record of the papers and discussions at the Newcastle meeting, also the usual list of the contents of the publications of the the various corresponding Societies.

In *The Geological Magazine* for June, Mr. W. D. Lang has a paper 'On some new Cenomanian and Turonian Cheilostome Polyzoa,' in which he describes a new species from South Elkington, Lincs., collected by Mr. C. S. Carter. It is called *Tylopora lorea*.

The Lancashire and Cheshire Naturalist for April contains many notes bearing upon the natural history of the counties covered by the journal, as well as a paper on the 'Pollination of the Henbane,' by Mr. W. A. Lee, and a report on False Scorpions by Mr. R. Standen.

We have received the *Annual Report of the National Trust for Places of Historic Interest or Natural Beauty*. Notwithstanding the strenuous times we are living in, this Society continues to do its very excellent work, which will certainly be much appreciated in the years to come.

Wild Life for May deals with 'Resting Attitudes of Moths and some Notes on their Habits,' by C. W. Colthrup; 'Colour in Animals,' by Charles Platt; 'Crossbills,' by T. M. Fowler; 'A Fight between two Gluttons,' by F. D. Welch; and 'Sexual Selection in Birds,' by Edmund Selous.

In the *Journal of the Quekett Microscopical Club*, No. 80, is printed the Presidential address of Dr. A. Dendy, entitled 'The Chessman Spicule of the Genus Latrunculia: a study in the origin of specific characters;' Mr. D. Bryce has 'Notes on the Collection of Bdelloid and other Rotifera;' and Mr. C. D. Soar describes 'Two new Species of Hydracarina or Water-mites, *Dartia harrisi* and *Eylais wilsoni*.'

The Journal of the East Africa and Uganda Natural History Society for March (Longmans, Green & Co. Vol. 6, No. 11, 5/4), contains the following papers:—'A Rare Forest Francolin,' by Dr. V. G. L. van Someren; Fishing at Mafia Island,' by C. W. Hobley; 'The Desiccation of Africa,' by R. L. Harger; 'Game Fish in Tanaland,' by R. Skene; 'A Natural History Expedition through the Kedong Valley,' by A. Loveridge; in addition to many shorter notes. The first paper is illustrated by a good coloured plate.

WATKINS & DONCASTER

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A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY
T. SHEPPARD, M.Sc., F.G.S., F.R.G.S., F.S.A.Scot.,
THE MUSEUMS, HULL;
AND
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TECHNICAL COLLEGE, HUDDERSFIELD.
WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF
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RILEY FORTUNE, F.Z.S.

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NOTES AND COMMENTS.

THE BRITISH ASSOCIATION.

The General Officers of the British Association having learnt, on consulting members of H. M. Government, that the proposed meeting at Bournemouth would be deprecated, it was decided to postpone the meeting for this year, and that Sir Arthur Evans remain president for another year. The Annual Conference of delegates from corresponding Societies, however, was held, in the rooms of the Linnean Society, Burlington House, on Thursday and Friday, July 6th and 7th. Mr. John Hopkinson, a Yorkshireman, was the president, and Dr. F. A. Bather, vice-president. There was a fair attendance.

PAPERS AND DISCUSSIONS.

Mr. C. C. Fagg read a paper on ' Regional Surveys,' illustrating his remarks by maps, etc. prepared by the Croydon Society; Mr. T. Sheppard, M.Sc. dealt with ' Weights and Measures,' and Mr. W. Mark Webb introduced a discussion on ' The part to be played by Local Societies after the War in the Application of Science to the Needs of the Country.' On Friday evening, the delegates were invited by the Selborne Society to hear an address by Prof. R. A. Gregory on ' Popular Science Lectures.' Owing to a series of unfortunate events, the notices to the members of the Selborne Society had been delayed, and the Selbornians were not present. Many of the delegates also had either returned home, or had fallen victims to the various lures of London. Prof. Gregory gave his address however, and those who heard it were indeed favoured and grateful. An address by Prof. Armstrong, on a similar theme, was also read, in the absence of the author. It was all very unfortunate; and the address given to those interested in popular lectures, at any rate, demonstrated that, besides the lecturer, another thing was necessary for the thorough success of a lecture, viz., an audience.

MR. HOPKINSON'S ADDRESS.

In his Presidential Address to the conference of delegates, Mr. John Hopkinson dealt with the work and aims of the corresponding Societies. As a writer in *Nature* points out, ' it was Mr. Hopkinson who first suggested, nearly forty years ago, that delegates from the different Societies should hold an Annual Conference, and it must have been some satisfaction to him to preside over what is now an important annual event for many of the representatives of the Scientific Societies in this country. Mr. Hopkinson gave a review of the work of the British Association as affecting the corresponding Societies, dealing in turn with the various sections of the Association. His address was so varied in its scope that each member of his audience must have felt that some of it at least had particular

reference to his or her own special study. It was not the address of a specialist, but on general lines, as might have been expected from a naturalist who has been so long the secretary of an important provincial society. Among the subjects dealt with were Meteorology, Geological Photographs, Bird Protection, Desmids and Diatoms, Maps, Free Trade, Kent's Cavern, the teaching of Greek, Museums, and Forestry. He concluded that the chief aim of all of us should be—

> "To make the world within his reach,
> Somewhat the better for his being,
> And gladder for his human speech."'

WEIGHTS AND MEASURES.

Mr. T. Sheppard, M.Sc. opened a discussion on the Metric System, and showed the necessity of some such scheme in the interests of the advancement of science. He gave an account of the various specimens of Money Scales and Weights in use from Greek and Roman to Victorian times. By far the finest collection of these money scales in the country, consisting of over 200 varieties of boxes, is now in the Hull Museum. In collecting Mr. Sheppard stated that he had had the help of Mr. J. F. Musham of Selby. The lecturer dealt with the absurdities to the present system of weights and measures, and illustrated this, as regards money weights, by a series of specimens from the Hull Museum collection. A long discussion ensued, which was continued on the following day. The paper was ordered to be printed in extenso in the Annual Report of the British Association.

THE MUSEUMS ASSOCIATION.

The Museums Association, for similar reasons to those which influenced the British Association, dispensed with its Annual Conference this year, but held a business meeting in the Victoria and Albert Museum, London, on July 10th. There were members present from all parts of the country, and among the subjects discussed were Rectangular Glass Jars, Income Tax on Art Galleries, and National War Museums. The members had the privilege of being addressed by Lord Plymouth on the subject of Local War Memorial Museums.

THE REPORT.

From the annual report we learn that the Association intervened in the matter of the National Gallery Bill, 1916, by a letter expressing the opinion that any pictures not required for the National collections could be absorbed by the provincial and colonial galleries, to distinct advantage, and asking that their claims should be considered before any were sold. The Bill called forth criticisms from many quarters and is now in abeyance. A letter of protest was sent from the Association

to the Leeds Art Gallery Committee, against the closing of their gallery, and the Council is glad to say that the Leeds Committee decided to re-open their institution. A memorial has also been addressed to the Prime Minister, on behalf of the Association, with regard to the appropriation of part of the Victoria and Albert Museum to provide offices for the Board of Education.

CORRELATION OF JURASSIC CHRONOLOGY.

At a recent meeting of the Geological Society of London, Mr. S. S. Buckman read a paper with the above title. He stated:—One of the principles utilized in this paper to ascertain or to surmise faunal sequence where precise information is defective, is that of what may be called 'faunal dissimilarity'—that is, if the deposits of two neighbouring localities A and B, supposedly isochronous from their sequential position, show differing faunas, it is a reasonable inference that the faunas are not of the same date. Theoretical stratigraphical correlation has usually worked along these lines, but the principle involved has not been recognized by name. Now the principle is utilized, not only in regard to neighbouring localities, but even more widely, with suggestive results. The paper is chiefly concerned with the Liassic Ages hitherto known as Domerian, Charmouthian, Sinemurian. In all of them there is proposed a considerable increase of the number of faunal horizons indicative of consecutive time-intervals, or hemeræ. In the case of the first no change of name is made; but in regard to the other two, subdivision seemed necessary, and each is apportioned into three Ages, as follows:—

Proposed Names.	*Old Terms.*
Hwiccian.	
Wessexian.	Charmouthian.
Raasayan.	
Deiran.	
Mercian.	Sinemurian.
Lymian.	

THE ARMATUM ZONE.

These, with the Domerian, each contain on an average about ten hemeræ, the grouping being controlled by the dominance of ammonite families or phases thereof—thus, Domerian: Age of Amaltheids; Raasayan: Age of Deroceratidæ and Echioceratidæ. It is obvious that, with this increase in the number of local non-sequences is greatly increased. Some comparative diagrams illustrate this. One of the most interesting discoveries which has resulted, partly from the great thickness of Scottish strata investigated and collected from, partly from comparisons with other areas, is that the so-called '*armatum* Zone' of the English Midlands and that of the Radstock district, of Yorkshire and of the Scottish Isles, are

not isochronous, but are separated by a time-interval which corresponds to a thickness of some 300 feet of deposit in the Scottish area. Thus, instead of the simple descending sequence

Deroceras armatum
Echioceras raricostatum,

there is this sequence ascertained:

An upper *Deroceras* horizon,
An upper *Echioceras* horizon in three distinct stages,
A lower *Deroceras* horizon.
A lower *Echioceras* horizon with some Armatoids;

and even now possibly this is not the end of the complication.

AMMONITE NOMENCLATURE.

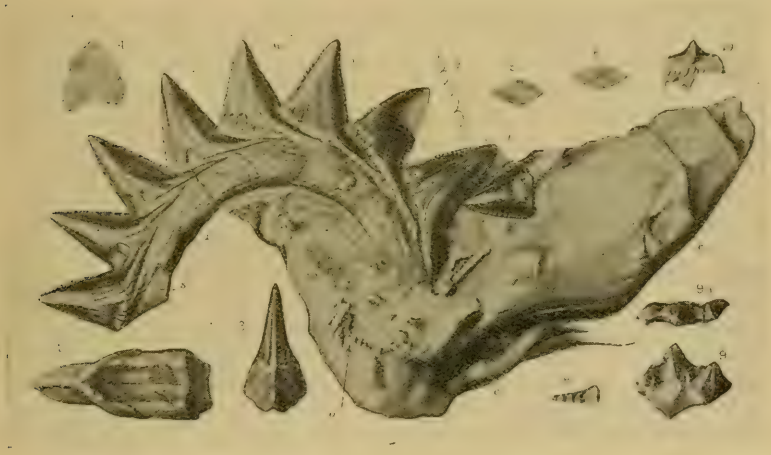
In the discussion which followed, Mr. G. W. Lamplugh, F.R.S., said that, while recognizing the scientific value of this intensive study of the Liassic ammonites, he feared that the Author's continued refinements of the nomenclature and zonal classification had carried the subject beyond the reach of the ordinary field-geologist. From the imperfect nature of the evidence, such exactitudes as those shown in the tables could rarely be applicable in the field. The use of fossils by the stratigrapher in the past, though crude, had generally been effective for his purpose; but he could not be expected to master the complicated technicalities of these new methods. The stratigraphical deductions drawn solely from these palæontological studies did not inspire confidence.

SECONDARY RUTILE IN MILLSTONE GRIT.

Mr. H. W. Greenwood recently read a paper to the Liverpool Geological Society, 'On an interesting Occurrence of Secondary Rutile in the Millstone Grit.' The grit in which the rutile occurs forms the base of a long ridge of hill which commences about a mile north-east of Macclesfield, runs for about two miles in a northerly direction, and terminates just above the village of Bollington. The particular exposure described occurs in a quarry on the hillside overlooking Bollington. The rock contains a quantity of light yellowish interstitial decomposition product, and it is in this and also in small cavities lined with iron-stained debris that the secondary rutile occurs in little glistening grains of a brilliant pink colour, sometimes deepening to a port wine tint. In some parts of the rock the crystals occur in such quantity as to become the dominant heavy mineral. The evidence points to the rutile having been formed from the alteration of a titaniferous biotite. In addition to the secondary rutile there are also deep yellowish red usually rounded grains which form part of the original constituents of the rock. Anatase is also abundant, generally growing on leucoxene, and staurolite was also noted.

EDESTUS NEWTONI.

The specimen of *Edestus newtoni* described in these pages for Nov. 1916 (pp. 352-353) by Mr. J. R. Simpson, has recently been described in detail by Dr. A. Smith Woodward in the *Quarterly Journal* of the Geological Society, and we are kindly permitted to reproduce, on a smaller scale, the illustration there given. Dr. Smith Woodward states that the new fossil displays a single example of *Edestus* with a detached dental crown and another fragment of the same form, near the tapering ends of a symmetrical pair of cartilages (*c*) which evidently represent a jaw. Whether they are upper or lower is uncertain, on account of shortness if the portions preserved ; but, as the



anterior ends suddenly begin to taper and eventually become very slender, they are probably the pterygo-quadrates of the upper jaw. The cartilage is well calcified in very small tesseræ, and, as shown both by the portions of jaws themselves and by remains in front of the fossil, the calcification penetrates more deeply than is usual in recent Elasmobranchs. The best-preserved outer surface of the cartilage, on the side of the specimen not shown in the figure, is slightly marked with scattered fine pittings, such as have already been described in *Edestus mirus*.

A TRANSPARENT RAT.

We learn from *The Publishers' Circular* that the Trustees of the British Museum (Natural History), South Kensington, applied to the Controller of Patents, recently, for licence to use the German patent 8621, of 1909, in the name of Streller, which asserts a sure process ' for rendering organic and in-

organic bodies transparent and translucent' by the employment of the refraction of light. Dr. S. F. Harmer, F.R.S., declared the process was a remarkable one. It offered peculiar advantages for the study of the internal structure of animals. You could take a rat and prepare it in a certain way, put it in certain solutions specified, and it would become extremely transparent, so that you could see the details of the skeleton through the skin and muscles. He desired to make use of the process at the South Kensington Museum. The general principle of making objects transparent by putting them in liquids of suitable refractory indices they knew about before the patent, and the patentee could not claim any patent rights in general scientific principles.

ECHINOIDEA HOLECTYPOIDA.

Mr. H. L. Hawkins has a paper in *The Geological Magazine* on 'Morphological Studies on the Echinoidea Holectypoida and their Allies.' Dealing with the Type of *Pygaster* he states: 'For the present purpose it is sufficient to note that there exists such a species as *Pygaster semisulcatus*, figured by Phillips (*Geol. Yorks.*) under the name of *Clypeus*, though not described by him; and that it was originally found, and may yet be collected, in the Coralline Oolite of Malton. This form must, then, represent the type of *Pygaster*, the Inferior Oolite species to which the name has been most frequently applied, being here regarded as not even congeneric. *Pygaster*, with its restored genotype, will include three of the four species described by Agassiz in 1839—*P. patelliformis*, *P. tenuis*, and "*P. umbrella*"—and so may be taken as expressing most adequately the original meaning of its author. It will absorb the subgenus *Megapygus* proposed by me in 1912, that name having been given in ignorance of the real meaning of the term "*P. semi-sulcatus*".' He concludes: 'The following list includes all the changes rendered immediately necessary as a result of the previous discussion:—

PYGASTER, Agass., 1836 (incl. *Megapygus*, Hawkins, 1912).
Type, *Clypeus semisulcatus*, Phill. Corallian (incl. *Pygaster umbrella, pars*, auct.) (non *Pygaster semisulcatus*, auct.).
PLESIECHINUS, Pomel, 1883 (incl. *Pygaster* sens. str., Hawkins, 1912).
Type, *Pygaster macrostoma*, Wright. Bathonian.
Generally speaking, *Pygaster* is a Middle and Upper Oolitic group, and *Plesiechinus* is restricted to the Lias and Lower Oolite.'

——: o :——

We have received the *Annual Report of the Public Libraries, Art Gallery and Museum Committee of Rochdale*, which contains a record of the work done during the year.

BIRD NOTES FROM HEBDEN BRIDGE.

W. GREAVES.

The decrease in the numbers of the two resident Thrushes, especially *T. musicus* (throstle) is the most conspicuous feature of the bird life of Hebden Bridge in the first half of the present year. In the cloughs in preceding years, from late April to June, it could be imagined there was one bird singing in each tree at daybreak, judging from the volume of song, but there has only been an isolated bird here and there this year, and never anything approaching normal song volume. Noticing this early on, I refrained from drawing a hasty conclusion, thinking that the severe weather persisting well into the song period of the species named might be partially responsible. There has since been ample evidence to justify my calculation that this year there is a decrease of at least 50 per cent.—and probably it is as high as 75 per cent.—in the song thrushes of the neighbourhood. I am confirmed in my impressions as to the relative scarcity by three other individuals, two of whom remarked on it to me quite voluntarily. The third, whose opinion I wished to ascertain because of his residence in the middle of the woods at the Hardcastle Crags, had noticed the scarcity — the absence of song is most obvious to even a casual observer—and had satisfied himself that it was due to the birds being killed for food purposes. The real explanation is, of course, the abnormally severe weather in the past winter. An attendant on one of our sewage farms informs me that five dead birds seen on the beds this winter were all throstles. Blackbirds seem to have suffered little, if at all. The missel thrush is, probably, a little less plentiful, but it has been difficult to arrive at a percentage on account of the shorter song period compared with the song thrush, combined with the further disadvantage of unsuitable weather at a time when the birds would have been most vigorous. Judging merely from song the woods in May have savoured more of August, and the effect has been depressing. Other species do not appear to have markedly suffered. Blackbirds are in usual numbers, and this year outnumber the throstles, which is unusual, but there is just a suspicion that Chaffinches, which are still plentiful, have slightly dwindled. In April, Meadow Pipits (few of which winter in the immediate district) seemed far from being present in their usual numbers, but perhaps they were later in arriving at breeding haunts this year. Most of the dates on which migrants were first observed are later than the average, viz., Wheatear, April 1st ; Ring Ousel, April 15th ; Swallow, April 22nd ; Sandpiper, April 24th ; Cuckoo, April 29th ; Willow Wren, April 29th ; Yellow Wagtail, April

30th; House Martin, May 1st; Tree Pipit, May 2nd; Sand Martin, May 6th; Redstart, May 6th; Spotted Flycatcher, May 6th; Wood Wren, May 6th; Landrail, May 13th; Whinchat, May 13th; Whitethroat, May 13th (none seem to have stayed so far as yet gathered); Nightjar, May 17th; Swift, May 26th; Garden Warbler, June 3rd; Blackcap, June 3rd. Matthew Barr, of Walsden, records Sedge Warbler for May 25th, an addition to the usual score which annually visit Upper Calder Valley.

——: o :——

The Caterpillar Plague in South-west Yorkshire.—The much-published account of the caterpillar plague on the high hills in the south-western portion of our county induced a few of us to visit some of the district on June 24th. Passing through Birds' Edge, Crow Edge, Hepshaw, Carlecotes and Dunford Bridge, we saw nothing at all unusual with any of the crops in the fields. Leaving Dunford Bridge and cultivation behind, we proceeded over the high Saltersbrook Ridge towards Woodhead. Directly we came to the Cotton grass bog, numbers of caterpillars of the Antler Moth (*Charæas graminis*) were crawling about in the road. Pulling up the grass revealed many larvæ just under the surface of the ground. On the summit of the ridge the larvæ were in very great numbers, crawling about in all directions. It was quite impossible to walk without killing some at every step. A rough square yard drawn in the road enclosed twelve live larvæ and a number of dead ones. Incredible numbers had been crushed to death in the roadway by passing traffic and perhaps a greater number had died by being washed into the streams. The cotton-grass bog on this ridge is a vast one, extending for many miles, and as the larvae were always plentiful all the way from Dunford Bridge to Woodhead, a distance of four-and-a-half miles, it must be past comprehension to imagine the number of larvæ feeding here at this time. The species is always abundant on these wild uplands, the males flying freely in the sunshine during August. During the time spent among the larvæ, it is interesting to note that no other larva of any species was seen, with the exception of a single wireworm.—B. MORLEY, Wind Mill, Skelmanthorpe, June 27th, 1917.

The above note refers to S.W. Yorkshire, but enormous numbers of larvæ have occurred elsewhere. Altogether it has been an extraordinary occurrence, the number of caterpillars having been prodigious, even allowing for probable exaggeration by the daily newspapers.—G.T.P.

METEOROLOGICAL NOTES FROM SELBY.

J. F. MUSHAM, F.E.S.

THE following readings were taken from a minimum self-registering thermometer, six feet from the ground, on a post facing S.E. in Brook Street, Selby.

It was not so much the severity of the weather of the past winter that made it so irksome and unwelcome, as the lengthened period over which it extended, coupled with the regular falls of snow or rain, so persistent during the latter part of the period.

The first fall of snow was on Nov. 18th, 1916, over a month before the scheduled date of winter, a timely warning of what was to follow.

On that date and the next day, starlings began to gather for food in the gardens, together with a hen-chaffinch, which evidently thought discretion the better part of valour, and stayed at home with her mate in preference to migrating.

The second fall of snow was on December 19th, temperature below the normal; the next on January 10th, followed by a heavy fall during the night of Jan. 13th—14th, similar during the night of 15th—16th, the temperature in the intervals calling for no comment.

Feb. 4th, snow practically continuous from this date; birds very tame and approaching the houses for scraps of food.

As thermometer readings vary even in restricted areas according to aspect and position of the instrument, the following records are not necessarily representative of the whole district.

Night of Feb. 4th—5th cold, thermometer 16 F. at 8 a.m. = 16 degrees of frost.

Do. Feb. 5th—6th cold, thermometer 14 F.
Do. Feb. 6th—7th ,, ,, 14 F.
Do. Feb. 7th—8th ,, ,, 16 F.
Do. Feb. 8th—9th ,, ,, 15 F.
Do. Feb. 9th—10th ,, ,, 16 F.
Do. Feb. 10th—11th, rise in temperature, ther. 28 F.
Do. Feb. 11th—12th, ,, ,, 26 F. thawing at 8-50 a.m.

On Feb. 8th and 10th, an unusual visitor to town backyards for food was the female of the redwing thrush. This bird, like the fieldfare, is seldom seen except in the open; a proof of a heavy snow fall and cold weather.

Nights of Feb. 12th and 13th, thermometer again down to 24 F.

Night of Feb. 14th—15th, thermometer 29 F., only 3 degrees of frost; warmer.

Night of Feb. 15th—16th, thermometer 27 F., rain during the day.

Night of Feb. 16th—17th, thermometer 28 F., day damp and foggy.

Night of 17th—18th, thermometer 30 F. (2 degrees frost) bright morning after rain.

To end of month—heavy rains, cold nights.

March 4th, heavy fall of snow, cold and strong east wind—a renewal of the early February wintry weather; getting colder.

March 7th—8th, ther. 18 F. to 8 a.m.

March 8th—9th, ther. 14 F. at 8 a.m., or 18 degrees of frost. Wintry weather till the 20th; on that day there was a strong breeze with light snow showers, and the same the following day.

March 22nd, still cold, strong wind with heavy fall of snow; thawing later.

March 23rd, again a slight covering of snow; night reading of thermometer 21 F.; wind variable.

March 25th—26th, ther. 26 F.

March 26th, still cold; snow showers, with strong northerly wind all day, and sunny intervals.

March 26th, caught a long-tailed field-mouse in front sitting room; this country cousin is a very unusual visitor to a house in a town,—a further proof of the severity of the weather, and lateness of spring.

March 26th—27th, heavy fall of snow during this night, wind N.E., ther. 26 F. at 8 a.m.

March 27th—28th, ther. again 26 F., milder during the day.

March 28th—29th, much milder; ther. 32 F. or 1 deg. of frost.

March 29th—30th, white frost at night; ther. 28 F.

April 1st, wind N.E., ther. 26 F.; much the heaviest fall of snow during the winter, no break in same from 7 a.m. to 3 p.m., then sudden rise in thermometer to 30 F. for an hour or so.

April 2nd, another heavy fall of snow, preceded by a very cold night, down 7 F., or 25 degrees of frost; an exceptionally low reading. Robin in garden with feet so cold it could not stand, later a brown wren in an almost similar state.

April 2nd—3rd, ther. 18 F., thawing at 9-30 a.m.; wind variable.

April 3rd—4th, another cold night, ther. 24 F.; thawing at 9 a.m.

April 4th—5th, ditto, rising at 10 a.m. to 40 F. with bright sunshine; wind S. by W.

April 5th—6th, snow during this night, ther, 18 F., followed by bright, sunny day; wind easterly, veering to N.W., thermometer up to 55 F. in sun at 11-30 a.m.

April 6th—7th, hoar-frost at night, ther. 25 F.
April 7th—8th, warmer, ther. 31 F., followed by bright, sunny morning.
April 8th—9th, heavy rain during early evening, frost in morning, ther. 30 F.; light snow showers during the day.
April 9th—10th, 2 inches snow; during this night, ther. 26 F.
April 10th—11th, another heavy fall of snow during night, ther. 27 F., rising to 50 F. 9-30 a.m. (civil time).
April 11th—12th, light fall of snow, ther. 27 F.; warmer during day.
April 12th—13th, no snow, ther. 28 F.
April 13th—14th, ther. 27 F. warm in the sun during the day.
April 15th—16th, ther. 32 F.; morning of 16th overcast; wind S.W.
April 16th—17th, snow during the night, cold N.E. wind.
April 17th—18th, ther. 31 F. rainy; day of 18th dull and cloudy, but warmer.
April 18th—19th, steady warmer rain, ther. 36 F.; saw a house-martin at 5-30 p.m., the first of the season—a harbinger of the belated spring.
April 19th—20th, ther. 30 F., followed by sunny morning.
April 20th—21st, ther. during the night lowest reading 40 F., bar. 30.4. The first night with such a high reading for four long months.

NOTE.—The double dates refer to the night readings of the thermometer.

For these notes we are indebted to the Editor of *The Selby Times*

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***Plusia moneta* in East Yorkshire.**—From the report of a meeting of the Hull Scientific, etc., Club, we notice Mr. R. Chapman exhibited a specimen of a moth taken at Hull on June 27th, and identified as the new 'Plusia moneta.' 'As this is a species that is not only comparatively new to British Lepidoptera, but has never been previously taken in Yorkshire, it evoked a good deal of interest.'—ED.

Plusia moneta is not quite new to Yorkshire, as a specimen was taken at Robin Hood's Bay, by Mrs. Holmes of Sevenoaks, so long ago as 1901. The first record for the species in Britain was in 1890, when one was captured at Dover. There was probably a small immigration at that time, and the moth evidently found our climate most congenial to it, and has since spread with wonderful rapidity, and is now quite common in our Eastern Counties, and will apparently soon become so in the Midland; and at no distant date, probably throughout England. It is essentially a garden insect, the larvæ feeding on Monkshood and Delphinium. Being a beautiful and conspicuous moth, it is too a welcome addition to our gardens.—GEO. T. PORRITT.

THE GEOGRAPHICAL DISTRIBUTION OF THE MOTHS OF THE SUBFAMILY BISTONINAE.

J. W. HESLOP HARRISON, D.Sc.

X.—THE GENUS AMPHIDASYS (TREITSCHKE).

Amphidasys betularia (Linn).

Palæotypical form, *A. cognataria* (Gn.). Distribution :— In North America : Northern Atlantic States, Quebec, extending in Canada as far west as the Rocky Mountains. In Asia : Ussuri and Amur Districts, West Central China to the Thian Shan Mountains, occasionally in Armenia.

Neotypical form, *A. betularia* (L.). Central Europe (excluding the Polar Regions and the Balcan Peninsula), Siberia, Japan, Armenia.

Amphidasys huberaria (Ballion). Western Siberia, Tibet.

Amphidasys thoracicaria (Obthr.). Ussuri District, Corea and China.

Amphidasys tortuosa (Wileman). Japan.

In discussing the geographical distribution of forms of such (apparently) erratic occurrence as *Amphidasys cognataria*, a mere consideration of present day geographical conditions is utterly futile. We have, if possible, to reconstruct for ourselves the position of the main land masses on the earth's surface when the forerunner of the form had occupied its maximum area, and then, from the possibilities there presented to us, draw the necessary conclusions.

Direct appeal to the geological record for fossil evidence, is, in the case of insects, almost useless from the very nature of things ; only in very rare and exceptional cases, exemplified by the Miocene shales of Florissant in Colorado, do such remains appear in any quantity. We can, however, argue from the fossils of less perishable forms which existed in the times we must consider, and which at the present time display the same range as the objects of our studies.

But before doing so, let us look at the structure of the continental masses of the Tertiary Period. Throughout Miocene time, and very probably in the Eocene and the Oligocene also, the continental areas of the Northern Hemisphere were much more extensive than at present. Almost certainly the only gaps in the huge circumpolar continent (if one may call a continent stretching as far south as the Gulf of Mexico circumpolar) were one to the east of the Japanese area, a second in Central Asia and another which, of a certainty, existed in Eocene times and probably, in part, far into Pliocene times along the Western Coast of North America. If others occurred they do not concern us here. The last-mentioned marine basin almost coincided in position with the land now

occupied by the Sierra Nevada, Coast Range and other Mountain Systems of California, Oregon, Washington and British Columbia. Exactly how far this extended into the Pacific does not affect our investigation. But let there be no misconception, although the connection was much more precarious than that between Eurasia and America to the west of the former, nevertheless there was a North Pacific link, possibly not a broad one, but including what is now the Behring Straits.

This enormous continent was bounded on the South by the great Sub-equatorial marine belt which effectually separated Eurasia and America from the Africano-Brazilian continent on the one hand, and from the Africano-Australian continent on the other. Whether the latter masses were connected to the west of the former is probable, but still doubtful.

It will thus be evident that North America was completely cut off from what then existed of South America. In fact, the formation of the Isthmus of Panama, and the uplifting of the Sierra Nevada, Cascade and Coast Ranges are two events, geologically speaking, quite recent in occurrence, certainly not taking place earlier than Pliocene times, and then contemporaneously. Even the Rocky Mountains are of no great age, the oldest portions being of early Tertiary origin.

Not only did the Northern Continent extend so far, but the climate, whilst varying as might have been expected as one passed from north to south, was remarkably uniform. Identical species in all groups of animals and plants are widespread in Miocene (for this is the period that concerns us most) fossiliferous deposits. In Greenland, Spitzbergen, Europe, Siberia and North America, genera such as *Liriodendron* (the Tulip Trees), *Sequoia* (Giant Redwoods of California), *Sassafras*, *Torreya*, *Magnolia* and *Onoclea* (the Sensitive Ferns) occurred as identical species.

Where now on the earth's surface are we to search for such forms? We find them in isolated localities, in some cases with a distance of half the earth's circumference between them. The noble *Sequoiæ*, which once held sway over the whole earth, now present two species, *Sequoia sempervirens* and *S. gigantea*, the latter with a feeble hold on a limited area at a height of 6,000 ft. in the mountains of California, and the former of fairly general occurrence on the western coast of temperate North America. Magnolias and the Liriodendrons are restricted to Eastern North America and Eastern Asia; whilst *Sassafras* only survives in Atlantic North America. *Torreya*—a peculiar gymnosperm genus—follows *Liriodendron* and the same holds true of the Sensitive Fern (*Onoclea sensibilis*). Had we not fossil evidence, it would have been difficult indeed to believe that these plants had once been of general distribution; in the case of herbaceous forms we can only reason

from analogy. If we find such fragile plants as *Podophyllum*, *Stylophorum* and *Boltonia* with precisely the same modern habitats as *Magnolia*, *Liriodendron* and the rest, we can only conclude that their histories coincide, *i.e.* that they once had an enormous range in the huge Miocene Northern Continent. Extending the argument from plants to other forms is again perfectly natural, and the same conclusions must be drawn. If the Bottle-nosed Sturgeons (*Scaphirhynchi*) and the Paddle-fishes (*Polyodontidæ*), and such Amphibians as the *Amphiumidæ* have likewise the same abodes nowadays, they too have occupied, in earlier ages, the same far-flung extent of territory. Finally, when we perceive insects like *Amphidasys cognataria* with a distribution exactly similar to all of these many beings, then it also has had the same vicissitudes ; it has once ranged over the whole habitable Northern Continent. *Amphidasys cognataria* then once increased and multiplied from the Rocky Mountains eastward to the Miocene limits of Eastern Asia and in areas, as the occurrence of fossils of *Juglans* and other plants cited above there proves, far to the north. As a matter of fact, the genus probably originated in North Eastern Pliocene Asia, *i.e.* an Asia reaching far to the north of its present limits.

Let us now consider what caused the breakdown of this once continuous distribution.

In earlier Pliocene times changes, tremendous in themselves, but when considered in respect to the northern land masses as a whole not fundamentally altering the positions of the great continents, occurred. Subsidences in the Northern Arctic Regions took place ; North and South America became united ; the Behring Straits were formed and so on. All of these changes working together, possibly aided by external factors effecting climate, brought about a marked alteration for the worse in the climatic conditions of the Northen Hemisphere, involving a general movement of all forms of life toward the south. Forms pressing southward into America and Eastern Asia, aided by the directions of the coast ranges, had an easy passage, in one case taking refuge in lands around the Gulf of Mexico and, when periods of subsidences set in, in the Alleghany Mountains and, in the other, following exactly the same direction and passing down the coastal ranges, in South Eastern Asia. And we must not forget that these migrating forms were in all areas almost identical.

In Europe the same attempts were made ; here, unfortunately, the main mountain systems stretch from east to west. Consequently, the path of the fleeing forms was barred and many of the more tender temperate forms, including *Sassafras*, *Liriodendron*, *Magnolia* and *Onoclea*, and hosts of others were crushed out of existence before access to the warmer regions of Southern Europe and Northern Africa

could be gained. Even then, any interchange between Africa and Europe was but slight and, had an easy crossing been possible, the Sahara Desert would have been hopeless as a refuge for temperate forms.

Throughout the Glacial Period, crowds of refugees successfully lived far from glacial conditions in Japan, China, Mexico and the Southern United States. It is necessary to note, however, that the Asiatic sanctuary, on account of its great southward extension, its warm Japanese current, its more decidedly insular climate, sheltered a great many more forms than did Eastern America. In consequence, even in the latter area, many species like the Maiden Hair Tree (*Ginkgo biloba*), once ubiquitous (as the fossils indicate), have died out, and yet have survived in Asia.

Here a new problem crops up. Had all of these surviving forms common to the American and the Asiatic areas been continuous right across America from the Atlantic to the Pacific Ocean, we should have attached no great significance to the discontinuity of the Asiatic and American habitats. We should have concluded that, in all probability, we were dealing with very early Quaternary Asiatic immigrants of the same group as such palpably Palæarctic invaders as *Papilio zolicaon*, *Thecla* (*Callophrys*) *dumetorum* and *Saturnia mendocino*, now domiciled in Pacific North America. But, strange to say, none of these Tertiary relicts common to America and Asia appear in California, Oregon, Washington and British Columbia. Not only do these groups fail, but indeed extremely few forms are common to Pacific and Atlantic America; in fact, the whole aspect of the two Floras and Faunas is totally dissimilar.

It seems, at first sight, that we have on the West coast the same conditions postulated as likely to favour Tertiary survivors. We have the same north and south trend of the mountains, the same coast conditions and the same insular climate. This summary of phenological conditions assumes, however, that the Pacific Coast of to-day and that of later Tertiary times were much the same. As a matter of fact, I believe that the coast line of that region, in Miocene and earlier Pliocene times, approximated to a line just west of the Rocky Mountains; all that existed of the coast states was a peninsula jutting out westward from Wyoming and Colorado. Only by this route was access for Eastern species to the Californian area possible. This explains the paucity of such forms as *Platysamia rubra* (representative of the Eastern *P. cecropia*) and *Telea polyphemus*, west of the Rockies, and shows why *Sequoia*, which revels in a very moist climate, persists in the west and not in the drier regions to the east of the barrier. Any great use of the gateway to the Pacific was an impossibility, for prairie and desert conditions, as well as the mountain

chain itself, militated against it. Probably *Sequoia* worked its way down the mountains and to its present, and very obviously, favourable stations.

Returning now to *Amphidasys cognataria*, we must picture it as driven southward and surviving the Glacial period in the Southern Atlantic United States, and in the Chinese area, with all the forms discussed above. With the appearance of more genial times, its course to recover lost ground was just that mapped out in the case of *Lycia ursaria*; therefore its distribution to-day in America is co-extensive with that of that insect. In China, too, its course was gradually northward and along the river valleys until its present stations were attained.

Now it will be noted that this form occurs in Turkestan, and crops up casually in Asia Minor. This may occur in two ways; we may have a reversal to type of the neotypical *A. betularia* or, otherwise, there has been, in some portion of Eurasia, a further refuge for Tertiary insects. If the former supposition were justifiable, then at any point in the range of *A. betularia, cognataria* forms should occasionally appear, and this is not the case; whence we must assume that the second supposition is the correct one.

This then involves the corollary that we ought to be able to produce species of similar history; and some of these should occur in North America. Such instances are easily adduced, and these in weighty and remarkable examples. Amongst them are the two Mud-fishes, *Umbra limi* in the Danube, and *U. krameri* in the Mississipi, the Walnuts—the genus *Juglans*—found in all three stated refuges of Tertiary relicts, Atlantic America, Eastern Asia and Asia Minor and, possibly, a fourth, Turkestan, unless it is to be regarded (correctly in my view) as part and parcel of the third. Thus, in a round-about manner, the history and geography of the palæotypical form of *A. betularia* has been traced.

Taking now the case of the neotypical and nymotypical form *A. betularia*, we find that it appears throughout the Palæarctic area from Japan to Britain; but, of course, is more or less of a northern insect, as its name '*betularia*,' derived from that of its chief food-plant birch (*Betula alba*), would cause one to surmise. Obviously, as it comes into intimate contact with *A. cognataria* in Southern Siberia, it has arisen from that species in that area, and, favoured by the slightly delayed advent of Glacial conditions there, has soon after its evolution, worked its way both to the east and to the west along the birch-clad foot-hills of the mountains of Central Asia where, in turn, it has given birth to the species *Amphidasys huberaria*. Thus, when an entrance was possible to Europe across the bed of the older and more extensive Caspian Sea, it pressed onward

amongst the pioneers of the great Siberian invasion which repeated, in some respects, the important Oriental wave which had preceded it ages before. Having once reached Hungary and Roumania, its path to its present localities was precisely that of *Lycia hirtaria* except that, as it arrived in Europe long after that species, it found the route *via* Dalmatia and Southern Italy to North Africa non-existent, hence it is absent from these points.

Two forms, which, in my eyes, do not rank as genuine members of the genus *Amphidasys*, yet remain to be dealt with, *A.* (?) *thoracicaria* and *A.* (?) *tortuosa*. These, in times anterior to the appearance of *A. cognataria*, even in its old world form, had come into being as a single mutation from the oldest Amphidasyd stem, as we recognise from the primitive wing pattern. Never enterprising, and not of any great vigour, it had restricted its range to lands kept warm by the warm Japanese current which plays the same role in the east as our Gulf Stream does with us. Still, it had colonised Eastern China, Corea and Japan long ere the latter country became an Archipelago. However, in the end, as we know, Japan was severed from the mainland, and with it was cut off, in part, the insect. This portion has diverged from that left on the mainland and has had the name *A. tortuosa* bestowed upon it; the remainder rejoices in the name of *A. thoracicaria*, but whether the divergence is really of specific value is a matter for some future zoologist of the East to elucidate.

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THE ICELANDIC FORMS OF LIMNÆA.

HANS SCHLESCH,
Hellerup, Denmark.

In the numerous hot springs scattered over Iceland *Limnæa peregra* Müll is very common. Besides this, the only other species of the genus yet found is *Limnæa truncatula* Müll. *Limnæa peregra* is a very variable species, and great care must be exercised in introducing and describing new forms, a view shared by the Norwegian conchologist, the late Miss Bertha Esmark, who writes (*Journal of Conchology*, 1886, p. 116) of this species as 'so changeable in form from two localities. All these variations and transitions make it very difficult and doubtful how to deal with varieties. . . . . I had the opportunity to collect them two succeeding summers on same place, but they are not only different the two years, but also each collection." Mr. Bjarni Sæmundsson of Reykjavik kindly sent me his finds of *Limnæa* from his voyage in the Nordur and Sudur Thingeyarsyslur in the North, during July-August, 1913,

and Mr. John W. Taylor, M.Sc., very kindly identified the specimens. During a visit to the Natural History Museum at Reykjavik, I had the opportunity of looking over the collections of shells there. All my own finds were made in the North-West, 1913-14.*

Mr. F. H. Sikes, of Sevenoaks (Kent), published a list of his collections made in 1912, in the *Journal of Conchology*, 1913, pp. 54-56, and in the *Proceedings of the Malacological Society of London*, 1914, pp. 11-12, Mr. Preston has described a new variety, *sikesi*. I have also referred to the localities of finds made by the late Professor Steenstrup, in Mörch's '*Faunula Molluscorum Islandiæ*,' 1867, and Dr. A. C. Johansen's '*Om den fossile Kvartære Molluskfauna i Danmark*,' etc. Probably Eggert Olafson† meant *Limnæa peregra* in his 'another kind, white *Turbo globoso-acutus, spiris tribus, testa crassiore, alba*, lives by a brooklet in Saudlauksdalur, and is to be found both in the water and on dry land,‡ and *Turbo globoso subacutus fuscus* is that species discovered in 1752 among the washed-up water-plants on the shores of the Myvatn, it follows then, that this species lives in this lake.' My own specimen and some of Mr. Sæmundsson may be seen in the Hull Museum.

I. Subgenus *Radix* Montfort.

1.—*Limnæa peregra* [Müller].

W. Bessastadir near Reykjavik (J.St.), Raudavatn near Reykjavik, 1912 ! (F.H.S.).
N. Svartadalsvatn, 1876 ! (T.Th. in R.M.).
S. Sidan, near Skaptá ! (J.St.). Laugarvatn in a temperature of 43°C. ! (J.St.).

(i.) var. *geisericola* [Beck].

(Syn. var. *minor* Mörch=var. *conglobata* Taylor.)

W. Laugarnar by Reykjavik! (J.St. and F.H.S.). Reykjavalla—laug, 11/7/1896 ! (B.S. in R.H.). Botn in Sugandafjördur, 1913 ! (H.S.), Raudamyri! Kelda ! Reykjanes in 45°C. ! Laugaland and Laugaból! all in the Isafjardardjúp 1913 ! (H.S.), Hjardarholt in Dalasyssel, Aug., 1887! (R.M.)
S. Near Hekla in 40°C., Geysir in 34°C., (A.C.J.).
N. Botnvatn, S. Thingeyarsyssel 1/8/1913! (B.S.).

(ii.) *forma albina.*

W. An albino specimen of var. *geisericola* was found in the hot spring near Laugaból, in the interior of Isafjördur, 4th June, 1914! (H.S.). Specimen in the Hull Museum.

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* *The Naturalist*, 1913, pp. 119-120.
† Rejse gennem Island, Sorö, 1772.
‡ It is characteristic of *L. peregra* that it often lives in mud, in ditches without water.

(iii.) var. *ovata* Draparnaud.

W. Engidal, near Isafjördur, 1913 ! (H.S.). Laugaból and Laugaland in the Isafjardardjup, 1913 ! (H.S.).

S. In a small lake on Vestmannæyar, 27/8/1877 (B.S.). Laugarvatn, near Reykjavik, 1912 ! (F.H.S.).

E. Sudurland Fljótsdalsherad, 9/9/1898 ! (B.S.).

(iv.) var. *steenstrupi* Clessin.

S. Laugarvatn, near Reykjavik, 1912 ! (F.H.S.).

(v.) var. *fontinalis* Studer.

S. Laugarvatn, near Reykjavik, 1912 ! (F.H.S.).

N. Grænavatn, Mývatn, 24/7/1913 ! (B.S.).

(vi.) var. *piniana* Hazay.

W. On a moor near Reykjavik, 27/7/1912 ! (H.J. in R.M.).

N. Botnvatn, S. Thingeyarsyssel, 1/8/1913 ! (B.S.).

(vii.) var. *microcephala* Küster.

N. Asmundastadavatn, Melrakkasletta, N. Thingeyarsyssel, 17/7/1913 ! (B.S.).

(viii.) var. *sikesi* Preston.

W. Raudavatn, near Reykjavik, 1913 ! (F.H.S.).

(ix.) var. *lacustrina* Clessin.

W. Laugarnar, near Reykjavik, 1912 ! (F.H.S.).

II. Subgenus *Lymnophysa* Fitzinger.

2. *Limnæa truncatula* [Müller].

W. Laugaland in Skjáldfánnardalur, Isafjardardjup, 1913 ! (H.S.).

S. Krisuvik, in hot sulphur springs (J.St.).
Geysir, 1912 ! (F.H.S.).

N. Akureyri, 1912 ! (F.H.S.). Svartadalsvatn, 1876 ! (T.Th. in R.M.). Mývatn, 1916 ! (F.P.).

(i.) *f. spira gracilis* Mörch.

W. Reykjavik-Tjörnin (J.H.). Laugarnar, near Reykjavik, (G.).

S. Krisuvik, Reykjanes (J.St.).

ABBREVIATIONS.

G.	=Adjunkt Grönlunds.
J.H.	=Jonas Hallgrimsson.
A.C.J.	=A. C. Johansen, D.Ph.
H.J.	=Helgi Jónsson, D.Ph.
R.M.	=Reykjavik Museum.
F.P.	=Francis Pállsson.
H.S.	=Hans Schlesch.
F.H.S.	=F. H. Sikes.
J. St.	=Japetus Steenstrup, Prof.
T.Th.	=Thorvaldur Thoroddsson, Prof.

ORNITHOLOGICAL OBSERVATIONS AND REFLECTIONS IN SHETLAND.*

EDMUND SELOUS

In my last contribution under this heading, I mentioned that twice, when all the Kittiwakes rose, apparently, at the same instant, and flew out over the loch, one Herring Gull stayed behind. I should have added these words, however, which immediately follow in my diary, viz., "The others have gone and returned with the Kittiwakes." The *φημη*, therefore, as will be later much more strikingly apparent in an observation which I have to quote, is not necessarily confined in its action to one and the same species. I did not put down, at the time, how many herring gulls stood, on this occasion, amongst the Kittiwakes. The maximum number, however, up to then, that I had seen thus associated with them, on the land, was seven, or possibly eight. That was on the day before, when the Kittiwakes, also, were more numerous, and had it been greater, in this instance, I should probably have recorded it.

October 14th.—It is noticeable that in any smaller segregation of these Kittiwakes from the main body, one or more Herring Gulls are generally to be seen. For instance, two, a young and an old one, are now in company with just a few of them that are bathing in the loch. Having watched the main assemblage for about an hour, I walked to the place and then patrolled the ground on which they had been standing, on the look out for any dead body, but I found none. It was easy to keep the right course, because of the feathers scattered all over it. I also walked to the first-mentioned bathing place, at the head of the loch, but there was no corpse there either. I then started for other parts, and, about a mile on, came to a loch near the sea, on the other side—the east coast—on the shore of which stood a lesser gathering, which I had noticed before, about a week or ten days ago. They went up before I could make use of the glasses, but five birds that were in the loch, when I came, remained there. Four were Kittiwakes, the other a young Herring Gull. On coming up to the place I found that it was apparently a larger assembly-ground than the other, feathers being freely scattered over a long and wide space along the shore of the loch. But here, too, I could find no dead bird. It seems evident, therefore, that it is to a very limited extent that the Herring Gull preys upon the Kittiwake—only perhaps, as I am now inclined to think, during a quite short period, after the latter have first come down from their nests on the ledges—then, too, but sparingly. Neither during this, or any other period, have I

* Continued from page 92.

seen them interfered with by the Great or Lesser Blackbacked Gull, nor have either of the latter species joined their assemblages. As the tide of vilification and inappreciative dislike of the first of these two—the Great Blackbacked Gull—more especially, is apt to rise very high indeed, I may as well say here that, according to my own experience and observation, he must be a very patient and persevering man indeed, who will watch one of these birds till he has actually seen it do any harm whatever. Yet all the while (though it may not have occurred to him) he will have been watching one of the greatest enhancements of the wilder sea-coast beauties of his native Isles. It has been asked by a landed proprietor what good does this bird do? But what of the landed proprietor himself? I know which does most good on a bold headland.

A single Cormorant standing now amidst a number of Shags. Its larger size, though at some distance, is at once apparent and gives a more interesting effect to the scene—relieving the sameness, whilst seeming to emphasize the character.

What I have written above as to the simultaneous flight and return of all the assembled Kittiwakes would equally apply to two assemblages of Shags on two great 'stacks' of rock at the extreme western point of this Island. They, too, have twice risen, all together, without the slightest warning or indication, flown out over the sea, and by the same common consent, returned and stood or sat as before. 'Wisdom,' we are told, 'cries out in the streets, and no man regards it.' So do facts not in harmony with current ideas. Things are simply not seen, until the cause of their occurrence is either known or supposed to be known.

On this eastern side of the island, numbers and numbers of Kittiwakes are now wheeling and hawking for fish just off the shore. I have given the prevailing coloration and markings of those that I have seen standing together, but now appears, almost in equal numbers, a variation of these so marked that one might think it belonged to another species, though it can only indicate another and earleir stage of growth. In this there is a broad black ring round the neck or, at least, all that part of it that can be seen in a view from above, for no under one is here possible. The wings are broadly edged with black all along their anterior margin; and two broad black bands pass across the shoulders, from the neck, all along where the wing joins the body. The tail, too, otherwise white, has a broad black edging. The rest of the colouring of back and wings is of a lighter hue than the blueish or mauvy one of the older birds. It is a lovely sight, these ever-flitting, light, graceful forms (the souls of birds rather than birds themselves they seem) beautifully and harmoniously blended, both in their alikeness and unlikeness. The coast-line here is wild cliffs—some lower,

some higher—from the summit of which one looks down upon them, flitting, hurrying, at a height, midway, then gliding lower, hovering near the water, about to plunge, sheering off, going to again, half plunging, righting themselves with an effort, re-hovering, poising, abandoning, returning, on the point—now !—no—yes—no—yes—and down ! They do not now close the wings and fall, like falling stars, they are hovering too close over the surface and have neither time nor space. Instead, they hold the wings up, as they enter the water, and though it is often head first that they do so, yet often too, it is a mere drop at full length upon it, the fall of an inch or two. In this case they do not disappear beneath the surface, but otherwise they do, and it may be from one to several seconds before they emerge again. Always there is the little jolt, forward and downward, of the head, and, even in the flattest effort, they may get their fish, as I have plainly seen them do, more than once, with the naked eye—glasses are not quick enough here. Sometimes, however, they will plunge from much higher, the action being then more like that of the Tern, though much inferior in grace, if not in effectiveness. It is delightful (though chilly) to look down from the frowning, overhanging brow of some high point, on to all these little, flitting forms, this atmosphere of wings and grace, this crowd of Ariels, ever crossing and recrossing, sweeping together and sweeping away again, as close, sometimes, almost as the flakes of a snowstorm, yet never touching, all so rapid, yet all so secure and easeful, though affecting you, almost, with giddiness.

Now another and darker form appears, graceful indeed (as any), but evil and piratical, that of the Arctic Skua, who, singling out a particular bird—one of the black-banded juvenals—pursues him so closely as almost, but never, as it seems to me, quite to touch him. He never deviates in pursuit of another, though others are all around, though he flies through a web of them ; none but this will serve. On they go, the persecuted one uttering indignant, hoarse cries of distress, his pursuer, still with hardly an interval, turning with every turn that he makes, curving and zigzagging as he does, so closely, so almost adherently as to make one think—for a simile—of the shadow that one cannot fly from ; of conscience, destiny, a haunting thought, or of a line I remember in the Ingoldsby Legends—

"'Running after him (so said the abbot)' like Bricks.'" *

There is no other Gull, in all this scene of graceful activity, there could be no other, I think, that would not seem ungraceful as part of it.

October 15th.—At eleven this morning there is a great assemblage of Kittiwakes at the usual place, the great majority sitting on the grass, really sunning themselves now, for it is

* "The Ingoldsby Penance."—*Fytte*, 3.

a beautiful morning—the sun of summer through the mists of autumn—even preening seems in abeyance. There are more Herring Gulls than yesterday, more than a dozen, young and old. There may be twenty. Whilst my glasses are full upon them, there is a sort of electric thrill or startle through the entire phalanx. All are now on their feet, seem to give a shake or ruffle of the plumage, and the next instant, all rise into the air and fly out over the loch—not one bird is left upon the ground. After circling and sweeping about for a moment or so, they all come flying back, but go down some little way farther off than where they were before. Careful searching with the glasses fails to discover any cause for this sudden simultaneous vacation and quick return. There seems absolutely nothing that can have startled the birds. No figure, either of man or beast, appears. I myself am too far off to have been able to put them to flight, had I tried, both by voice and gesture—considerably further than when I watched them on the previous occasions without their being in the least disturbed by me. Why, indeed, should they be, since all gulls here are quite familiar with man, and trouble themselves very little on his account? Moreover, had the birds really been frightened, they would certainly not have behaved as they did. Nothing in their actions spoke of fear, but everything of enjoyment, on the bird plane. A sudden outbreak of spirits on the part of any individual bird or animal may not surprise us, though it seems curiously human, but that it should be simultaneously shared in by more than a hundred, who have all, up to a moment previously, been in a state of rest and quiescence, and of whom no one could, on account of interposing bodies, have been so placed as to be able to see all the others, is certainly a puzzling phenomenon. It has the appearance, indeed, of a miracle, which it is, or as much as any other, since a miracle, if substantiated, is only something of which the cause is unknown. Man never wonders but through ignorance, for in nature, as apart from mere human sensation, one thing is neither more nor less wonderful than another. At least I venture that proposition.

Striking again for the east coast, I passed the loch mentioned in my entry of yesterday, on whose banks there is another large gull meeting-ground, which was now quite deserted. By another loch, quite inland, a good many Herring Gulls were assembled, but before I could get to a coigne of vantage, from which to watch them, they rose (I cannot in this instance say under what circumstances) and flew towards the sea. All were Herring Gulls. Later, whilst walking along the same cliff, as yesterday, I saw, when some way off, another assembly of these Gulls, standing on the green head of one of those bastion-like bulgings of the precipice so frequent here, owing to the erosion of the sea on either side any promontory,

along the narrow neck of which a man—and sometimes even a sheep—can with difficulty pass. The situation here was an admirable one for the class of research I was engaged in, for behind the birds, and cut off by this ridge of approach was the great lonely slope of the hill, rising to the sky-line, whilst in front of, and many feet below them, was the equally lonely great sea. Yet thus standing, isolated and alone, with nothing visible where there was such complete visibility, a sudden motion broke out in the band, as a whole; the front ranks ran, in a peculiar eager manner, in the direction in which they had been standing—of the sea namely—and were followed after a moment, by those behind till, in a second or two, all rose, flew swiftly over the cliff's brow, and, after circling and sweeping for a little, in a wild tumultuous manner, and with shrieking cries, dispersed in various directions. They were all Herring Gulls with the exception of a single Great Black-backed, who joined in the exodus, its partner having gone off, some time before. Here too, then, though not quite instantaneous, as in the previous instance, a sudden general impulse towards flight seems to have arisen in the assembled birds without any discernible cause for this, external to their own minds. There was a sudden idea apparently, a sudden little run—and off! I have mentioned the 'eager' manner in which the birds ran. The word is an approximation merely, and was suggested much more by the expression, as caught through the eye and way of holding the head, than by the gait. It was a very odd look that they presented, not at all easy to describe, but perhaps more equivalent to what in ourselves we should call wrapt than to the idea conveyed by the word I have used. I had the sense of having witnessed something strange and unaccountable. It was as though, upon a sudden, the birds had heard a voice, saying 'Fly!' To convey this convincingly to anyone not a witness of the incident is impossible. Birds must be watched hard, and the spirit out of which only such watching can proceed, is a down-gun and up-observation one.

October 16th.—Kittiwakes standing or sitting on the wet sand at 9-30, this morning, twenty-one in all, eighteen sitting, of which fifteen are asleep, that is to say have the head turned back, and bill buried in the dorsal plumage—in popular parlance the head under the wing. Of the three that stand, one also has the head thus turned and two are preening. This so-called sleep is hardly, I believe, really such, for the bird that, if it were, should be asleep, stretches one leg backwards now, in the common bird fashion so pleasing to see. There is another little group of eight, near by, who sit on the dry sand, as the others on the wet. Six of them tuck in their heads first, and then the other two. To the Kittiwakes, now—those of them upon the wet sand—flit in, like shadows, from seaward, three

or four little Ringed Plovers, and walk seekingly where sand and tide meet. Soon, however, they seek the pebbles and sandy shingle higher up, and standing there, also turn their heads bedwards, which, in a front view, gives them the lugubrious appearance of having all been decapitated just above the little white collar. The apparent necessity of exercising their wings, every now and then, breaks these slumbers. They are opened for a moment, and, in leisurely fashion, spread vertically upwards, by which the suddenly revealed under feathering gleams out a soft, silver white. And since the bird, to do this, is awake, however short the time some fraction of it must be given to preening, and the indispensable little bob. A good preliminary for the shaking off of sleep is to hop a little on the one leg that is commonly in use whilst it lasts.

Their colouring certainly makes these birds very inconspicuous amongst the stones they delight in. Whether they know this, in effect, and trade on it—that is to say whether natural selection has shaped their habits as part of the same process by which she has produced their outward garb—is a question which may be variously, but never, I suppose, finally answered. I have walked up and down the fore-shore, parallel with a group of them, decreasing the distance between us with each turn. At fifteen paces they stood firm. At ten, after huddling a little closer to the water, they went up. Eleven paces—they must be natural and not overdone ones—is pretty near to get to birds.

A Herring Gull is swimming near the shore, followed closely by her big young one, who, with bowing head, and little piping cry, presses importunately to be fed—but she will none of him. A few others, farther off, are also thus followed by their chicks, brown, but as big, or nearly so, as they are. I have not seen one fed, but they are not driven away. The parent's plan here, is to fly away herself. This also seems to apply to the Shag—at least I have seen it, but not the other. There are as many light as dark ones to be seen together now, yet very few are still being fed.

A pair of Rock Pipits, one would say, if one went by topogrpahy, but otherwise Titlarks, now run and flit along the sea-shore, pecking amidst the pebbles at the moist edge. Sometimes, with keen eye and investigative step, they draw near to rocks which are to them as sundered masses of the cliffs (here called ' stacks ') to us, at the hanging seaweed of which they pull daintily, their plain but dapper little bodies standing out against the wet base, smooth and naked, in a very charming manner. Certainly they seem to me, these little pipits, to be of the meadow and not the rock kind. Their bodies are longer and lankier, as well as lighter coloured, and moreover they both came from meadows, and, having returned to them, come not again. When first seen upon the borderland—the turfy bank

that bounds the higher dry-stone beach—they were pursuing one another in sportively amorous fashion, piping one-notedly, the while. The ' chord of self,' however, has not ' passed out of sight ' (or become double) along these lines, whether in music or otherwise, since if it becomes apparent to the one that the rock which the other has chosen is yielding a rich harvest, the former flies down upon it, and puts the prior harvester to flight. Whether the parts played by the actors in this small drama are constant or interchangeable I cannot state positively, the sexes, in appearance, being indistinguishable. Nor is it to be settled by internal evidence, since with birds, at any rate, the hen is quite capable of being in the wrong. The Rock Pipits, also, seem to spend their time, when not actually feeding, in little flights after one another, uttering, the while, a weak little ' pseep, pseep.' ' A solitary, serious creature, little caring for the society either of members of its own or of other species '* Thus, Gætke describes this bird, and again, though this may be upon a fine spring morning,' he says, ' solitary, serious and active, and without displaying any particular shyness in regard to man, it performs the various functions of its daily existence.'† But in these the whole of the activities connected with the reproduction of the species are included, and the fact that nothing whatever is said about this well-nigh half, and certainly most interesting part of the whole, renders the above description, which purports to be a general one, negatively, at least, very deficient. The deficiency is greater than might be imagined for, according to Gætke, who, of the ' various functions ' has (except for the call-note, which is just mentioned) only said anything about one, the bird ought, by its present conduct, to approve this summing-up of its character, for it is not even spring now, but half way through October. It should be 'searching for food, walking step by step, only rarely at an accelerated pace, over the sea-tang on the shore, or on the rocks and debris exposed at low tide, uttering its call-note only when taking to flight,'‡ etc., and in this, or in anything else it might be doing, it ought to be quite by itself. Yet here it is, neither solitary nor, apparently, for the moment, hungry. For the Rock Pipit can love, and since the actual business of love is now over, the actions here mentioned exhibit it in a light not compatiable with the rigour and circumscription of Gætke's description. We see the bird emotionally acted upon, at a time when emotion is no longer necessary for the continuance of the species. As with us, that force through which, if at all, life is to maintain itself, has produced its quite similar

* Heligoland as an Ornithological Observatory. Translated by Rudolf Rosenstock, M.A. (Oxon.), 1895, p. 342.

† *Ibid*, p. 343.

‡ *loc. cit.*, p. 342.

by-product of enduring affection. Whether the latter, ' bright, consummate flower ' though it may seem to us to be, is not a little tainted in its origin, is a question which we must all answer in our own way, that is to say strictly according to temperament, and not at all as being hampered by facts, or through logical inference; for thus do ' views ' grow up in the human mind, that is to say in the majority of human minds.

A number of Kittiwakes are now standing together on the beach, at the end of the voe, all of which except one, have the green bill and legs of the mature bird. A Crow—all the Crows here are ' Hoodies '—hops up, with a sort of bullying air to within a few feet of one of these Kittiwakes—not the single juvenile one—and, making a sideway offensive movement, or pretence of it, puts him to flight. After this, he pecks about a little, and then walks up, nearer still, to another of them, but without any demonstration, and this one stands firm. It looks as if the Crow wished merely to assert himself as cock of the walk, to hint that the ' *force majeure* ' lay with him, and that the position thus laid claim to was recognised by the Kittiwakes. There is a Herring Gull with its young one amongst this group of ' coloured ' Kittiwakes. Going back to the other groups, at the opposite end of the beach, who have now settled on the grass above it, I note that they have, for the most part, unmistakeably black or dark bills, whilst in a few, they are more advanced towards the bright greenish hue. There seems, therefore, to be a tendency for the birds to associate, according to colour, but, in the present instance, this applies more to the bill and legs than to the plumage.

I now walk on, along the shore of the neighbouring loch, and find the Kittiwakes assembled on one of their usual gathering-grounds near its farther end. I take up my position on a mass of rocky earth, three hundred to three hundred and twenty paces distant, and having seated myself, turn the glasses upon them, placing them first, as is my plan for long-continued observation, on the seat of my walking-stick camp-stool.*

* This I find admirably adapted for this purpose, since, with a hand on the cane margin of each wing of the seat, they can not only be kept quite motionless, but also be moved very steadily, either from side to side or in a wide half circle, as occasion may require. As it happens, the mechanism of the seat so fits itself to that of the glasses, that, unless for aerial observation at a high angle, it is not even necessary to strap them on to it, which however, can easily be done. What is of still greater advantage is that the point of the stick, very often, need not rest on the ground at all—or even on one's waistcoat or trousers—for it can be held so firmly in both hands, whilst one sits, as to render this quite superfluous. As, in all my watching, I have been accustomed to carry this particular kind of camp-stool, I have never felt the want of any fixed rest for the glasses. Fixity in field observation must be attended with certain disadvantages. The above may perhaps be of use as a hint to fellow observers.

The Kittiwakes, in so far as I am able to count them, number some ninety odd, but must really be well over a hundred, being, in some parts, so closely packed that it is impossible for me to make out every individual. I have not sat long, thus watching, when, all at once, in 'this very now of time,' there comes that collective burst from, more or less, total inaction into fullest sudden activity, which I find it so hard to understand—for the normal channels of sense do not seem adequate here, and nobody understands thought-transference, if it be that. This time, there is all at once, a great waving of a host of wings, as the whole of the birds rise and sweep off over the loch, from which, after a few seconds, they sweep back as usual, but whilst about half return to the same place, the rest go down where I first saw them bathing, some couple of hundred yards or so away. It appeared to me that the movement began at one end of the assemblage—instantaneously as far as a number of pairs of wings were concerned—and became universal about a second afterwards. But this may very well have been because my fixed gaze, through the glasses, could not concentrate on the whole extended line at once. Certainly, in a mere moment or two, the whole flock were in the air, with the grass, from which they had gone up, perfectly bare, not a single bird staying behind. Some attendant Herring Gulls were of the party, and rose and went off with the rest. There was absolutely nothing, so far as I could see, to startle these Kittiwakes, and, by the very conditions of things here, there hardly could have been. In my judgment, however, this cause is excluded by the very nature of he phenomenon.

After this, I walked towards the east coast, in the same direction as yesterday, and coming within view of the loch, again saw a number of Herring Gulls collected at the same spot. I counted, at first, fifty-two, and, during the time I watched them, the number varied (approximately) from this, to sixty and thirty-seven. There were no Kittiwakes, the single alien being a Great Blackbacked Gull. It was 2-20 p.m. when I sat down to watch these birds, an ordeal—and, during the latter stages I may well call it so—which lasted till just upon 4. During all this time, there was a continual passage of birds, in more or less numbers, as indicated above, between the loch, where they bathed and disported, and the gathering-ground, where they stood or sat, preening or sunning themselves, for it was sunny most of the time, but so cold, latterly, that the sun itself seemed to partake of this quality. Many also dispersed themselves, feeding, over the hills, but most of these, as also of the bathers, either came back or went away altogether. But there was no general movement amongst those that remained on the shore, and, at the last, may have numbered some forty. Just before 4, three or four birds, with a little preliminary run, flew off towards the sea, and these were

followed, on the spur, by another three or four, and then another and another, and thus they departed, in little batches, till only about a dozen were left, who showed no desire to go with the rest, but continued to stand or sit stolidly. Having seen all I wished to see, therefore, I now pursued my path, which lay through the place of resort, to the sea, where, however, I saw nothing worth entering.

What, if any, conclusion, is to be drawn from the above observations? No cause beyond that of a common inclination need be sought for to explain the quick following of one individual Gull by another (had this been the case) for probably, taking the time of the day into consideration, each would know or surmise where those that preceded it were off to, so that a predisposition would be stimulated by example. But why were the several departures in batches? The same idea seemed certainly, in each case, to occur to some of the birds at the same time. If we liken each unit of the collected flock to an electric battery dealing out shocks to other units round about it, then both the force of the shock and the numbers by whom it was felt would be in accordance with the strength of the battery, that it is to say, in the case of thought transference, with the vividness of the thought arising in the mind of each bird. Thus (and this might conceivably depend upon atmospheric conditions), on a day when the birds were feeling great mental alacrity, we migyt expect to see the whole flock act suddenly, all together, in a flash, as in some of the cases I have recorded; but when they were duller and more mopish, the impulse, in whatever part of the assembly it originated, would not be likely to extend so far out from the centre of energy—from any individual, that is, to say, or to produce action in all those to whom it did extend. The result of this might well be that the flock, instead of going off all together, would do so in little groups or batches as has been here recorded. In this case, the last batch, or, rather, a small number of birds, towards the end, would be left alone, and, partly as a result of this, since there would be no others around them, to transmit the influence, and partly, perhaps, also, on account of fewness of numbers being in itself, a less favourable condition for thought-transference than the opposite one of a large assemblage, these might either stay longer before the φημη broke out amongst them, or go at last upon individual prompting, merely, without its having done so. I regret now that I did not continue to watch till the birds were all gone, for I might then have been able to judge of this.

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We have received the *Report of the Norwich Castle Museum Committee* for 1916, which gives the usual evidence of the good work done at this instituiton, with a list of the additions during the year.

In Memoriam.

SAMUEL MARGERISON.

Our world is poorer for his death, and yet
May we not hold that still beyond our seeing
The choate forces building up our being
Engerm in what he leaves us, well inset
Of languaged concepts, something of the debt
That nature-lovers owe to such as he
Who dower us with a richer field ' in fee '
For further insearch ? Let, then, no one fret.

He won Regard—he kept what so he won,
Despite such frailty as is heir of flesh ;
And now amid our mourning, and the stun
Of recent loss, let each of us, afresh,
Pick up the down-dropt clew, the riven mesh,
And, maybe, frame a whole of what he spun.

Naturists, truly, are on solid ground
Who take what men call ' Fate ' in perfect trust ;
For what is any thinking form but dust
In vital patterns cosmically bound ?

Floweret and flesh cell are not kin to sound,
But atoms of the Immortal undiscussed;
And thirst for knowledge, prayer! not brainy lust
But verity, transmutable, profound.

We loved him as he loved all Nature fare,
The verds of earth her garment, Spring renews,
The forest giants green or winter-bare,
The fairy forms that feed upon her dews;
And drink a like upliftment from her cruse,
Fearing no drop of gall, for none is there!

F. Arnold Lees

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CHARLES BRADSHAW.

We regret to record still another gap in the ranks of Yorkshire geologists, caused by the death of Charles Bradshaw, which occurred with tragic suddenness on the morning of July 3rd. He had been at business on the previous day, but was taken suddenly ill on the evening, and died a few hours afterwards. Charles Bradshaw was in his fifty-seventh year. He had been on the staff at the Sheffield Museum forty years, commencing work there as an assistant at seventeen; in recent years he was the assistant curator. He paid particular attention to the geological and natural history section of the Museum. He took a prominent part in the work of the Sheffield Naturalists' Club, and had occupied the offices of Secretary and President. He was interested in the work of the Yorkshire Naturalists' Union, held positions on its Committees, and was secretary of the geological section. He was not a prolific writer, but the results of some of his work will be found in the pages of *The Naturalist*. We extend our sympathy to his widow and family.—T.S.

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Wild Life for June contains the following well illustrated papers:—'Some Reflections on Swallows,' by C. R. Brown; 'On Colour in Animals,' by Charles Platt; 'Illustrations of Conflicting Impulses in Birds,' by F. B. Kirkman; 'Sexual Selection in Birds,' by Edmund Selous. The photographs illustrating Black Headed Gulls squabbling are especially interesting.

The Vasculum for June is a particularly good number. Mr. H. G. Bolam writes on 'Some of our Reptiles and Amphibians,' with illustrations of the common adder, the little red adder, and the grass snake. Mr. G. Bolam gives 'Jottings from the East Nook of Cumberland'; Mr. N. H. Patterson deals with 'Natural Features in local Place-names'; Mr. H. S. Wallace writes on 'Eel-worms'; Mr. R. S. Bagnall on 'Primitive-Tails, Bristle-tails and Spring-tails'; 'A Rare Pond Snail' is by Mr. George Bolam; 'Ornithological Notes from Middlesbrough,' by Mr. C. E. Milburn; 'Northumbrian Pisidia,' by Mr. A. M. Oliver; 'A new species and Genus of *Aleyrodidæ*,' by Dr. J. W. H. Harrison, and there are records of Acari.

NORTHERN NEWS.

We notice that Major A. R. Dwerryhouse, D.Sc., has been elected President of the Belfast Naturalists' Field Club.

A fine bust of William Smith, 'The Father of English Geology,' has been purchased for the Museum at Hull. It was formerly in the possession of the late Sir Andrew Ramsay.

The *Twenty-sixth Annual Report of the Royal Society for the Protection of Birds* has been received. It describes the way in which bird protection has been affected by the war.

We learn from the press that the caterpillar 'plague,' which has wrought havoc on the Caldbeck range of hills in Cumberland, is subsiding. Large quantities of the grub have been destroyed by firing the herbage on the fells, but the rooks, gulls, and starlings, which have been attracted to the place in thousands, have been the greatest factor in reducing the pest.

The *Ninety-fourth Annual Report of the Whitby Literary and Philosophical Society* contains particulars of a number of valuable additions to the Museum, among which we notice 'Gills of a southern Right Whale,' though if these are 'gills' the whale must be a 'wrong 'un.' The report contains valuable meterological reports, and though the society is a small one we are glad to see that it is still flourishing.

Punch says the most satisfactory test to distinguish edible from poisonous fungi is to look for them. If you find them they are likely to be poisonous. If they have been already gathered they were probably edible. This is nearly as good as the plan recommended by a well-known Yorkshire mycologist, whose advice was 'try them on the Missis; if she lives, they are all right: if she doesn't, they are poisonous.'

The following is possibly a joke, so we must not quibble at the fact that no neolithic man could possibly have stoned a mastodon:—

IN DAYS OF YORE.

An irate Neolithic man,
His anger to assuage,
Once stoned a peaceful mastodon—
('Twas in the Stony Age).

His simply-costumed lady-love,
Who dearly loved to pun,
Remarked with sparkling, roguish eyes.
"What has the mastodon?"—CHAPARRAL.

We take the following from the *Yorkshire Weekly Post*:—A BOLD RESOLVE.—"Mr. S. L. Mosley, F.E.S., Naturalist to the Huddersfield Technical College, is an enthusiast of no mean order. In the 'Huddersfield Examiner,' he writes:—'Lately, in connection with my museum work, I have had occasion to extend my knowledge of the birds of foreign countries. I have been so struck with the exquisite beauty and variety, and with the many forms so entirely different from anything we have in this country, that I have resolved to paint the likeness of every kind of bird in the world.' The order appears somewhat a large one for a gentleman, who, on his own admission, has attained to the patriarch's three score years and ten, but the spirit that can calmly contemplate such a task is certainly to be commended. We might suggest to Mr. Mosley as a sequel to his new work, a series of coloured plates of the Beetles of the world, with their caterpillars, arranged on some simple plan. There are, we believe, about 130,000 known species, and their identification is often extremely difficult from the existing books." As the British Museum hand list of birds, by the late R. Bowdler Sharpe, published some little time ago, contains about 18,500 species of birds other than those in the British list, we can only hope that Mr. Mosley will be enjoying good health when his labours in that direction are completed.

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A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY
T. SHEPPARD, M.Sc., F.G.S., F.R.G.S., F.S.A.Scot.,
THE MUSEUMS, HULL;
AND
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TECHNICAL COLLEGE, HUDDERSFIELD.
WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS, OF
J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.R.S.,
Prof. P. F. KENDALL, M.Sc., F.G.S., JOHN W. TAYLOR, M.Sc.,
RILEY FORTUNE, F.Z.S.

JUN 21 1920

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NOTES AND COMMENTS.

FOSSIL PLANTS.*

There are two kinds of workers to whom students are especially indebted; those who carry out original investigations, and those who, having a bibliographical bent, bring together a summary of the work of others, and thus save endless time in searching through oceans of literature for information upon any particular subject in which a student may be interested. In 'Fossil Plants,' we have the results of Prof. Seward's investigations, as well as a most reliable record of the work of others; consequently we are doubly indebted to him. In work of this kind it is essential that a writer should be thorough, and the enormous strides made in palæobotany in recent years in all parts of the world, prevent a standard

JUN 21 192

Williamsonia whitbiensis (after Nathorst; $\frac{2}{3}$ nat. size).

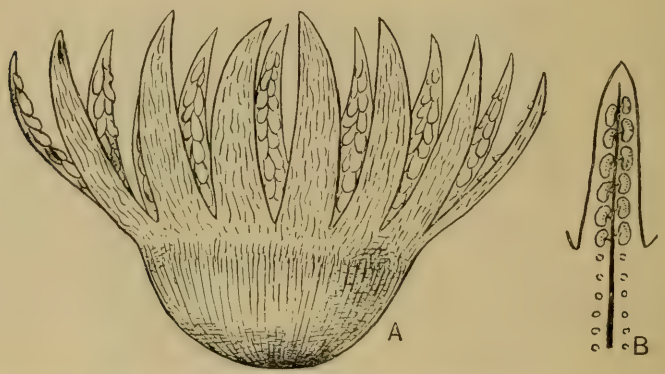
work being published quickly. So long ago as 1898, the first volume of this treatise appeared; Volume II. in 1910; Vol. III. is before us, Vol. IV. is in the press. Prof. Seward hopes it will be published before the end of 1917, and the publishers hope it will appear early in 1918. The first two volumes have already been noticed in this journal, and excellent though they were, Vol. III. is even better.

JURASSIC PLANTS.

In some respects it is perhaps as well Prof. Seward was not able to publish the complete work in 1898; as it is, we now have a useful account of the remarkable flora of the Yorkshire Oolites. A systematic study of some new aspects of this flora was commenced a few years ago by a Committee of the Yorkshire Naturalists' Union, was continued by Mr. H.

* Vol. III., pp. xviii. + 656 pp. 15/- net.

H. Thomas and Prof. Nathorst, and ably summarised by Prof. Seward in his presidential address to the Yorkshire Naturalists' Union in 1910. The section devoted to the Yorkshire Jurassic plants is an important section of the present work. The volume is dedicated to Professor Charles René Zeiller, and deals with the Peteridospermeæ, Cycadofilices, Cordaitales, and Cycadophyta. There is also an important section devoted to Palæozoic seeds. Each contains a scholarly summary of all that has been published, in addition to the original work of the author. The references to the literature on every possible section will be a great boon to present and future students. The value of the work is greater by the wealth of illustration, there being over 250 in the present section; and for this we are doubtless indebted to the generosity of the



Williamsonia whitbiensis.—A, male flower; B, sporophyll with symangia. (After Nathorst).

Cambridge University Press. We are permitted to reproduce two of the smaller blocks.

DUCKS AND PLANT DISPERSAL.

Writing in *The Selborne Magazine* for July, the Rev. E. A. Woodruffe-Peacock states 'Few Naturalists still grasp their surroundings sufficiently to carefully watch what is going on unobtrusively, yet actively, under their noses, as I may say. So the poverty of illustrations of dispersal in Darwin's and Wallace's works, and of other later writers, even such as the the late Clement Reid, in "The Origin of the British Flora," has not yet been supplemented by the present generation of workers. Early in life my mind was turned, by Darwin's notice of the seeds in the ball of clay on the foot of a Partridge, to noting all questions of dispersal. The first almost that struck me was the sowing abroad by young blackbirds (for

the young Thrushes rarely took part in this work) of the *Ribes* species of our kitchen gardens. The Gooseberry was everywhere, in woods and hedges alike, in endless forms of varieties. The Red Currants came next in frequency, but the Yellow I did not see for very many years. Their colour did not then attract the attacks of birds. At that time, I still believe, they thought Yellow Currants were unripe red ones; but they have become better educated in the last fifty years. The Black Currants were then, and are still, much rarer; but all these, with the Raspberry added, were not uncommon on the Pollard Willows round about my home. Though I was only a child of ten at the time, under the influence of Gilbert White's "Selborne" and Charles Darwin's works, what I had discovered set me thinking and observing still further.'

A GLOBULAR SPRINGTAIL.

In *The Vasculum* for June, Mr. R. S. Bagnall deals with

some of the neglected orders, viz., Primitive-tails, Bristle-tails and Spring-tails. Mr. Bagnall has added to our knowledge of the less-known orders very considerably, and his records are always reliable. The specimen figured herewith is reproduced from the paper cited, and shows a globular Springtail, *Sphyrotheca lubbocki* Tullb. (*Sminthuridæ*). Size, 1·3 mm.

BIRMINGHAM NATURALISTS.

We have received Part 1 of Vol. XIV. of *The Proceedings of the Birmingham Natural History and Philosophical Society* (56 pp., 3s.), edited by Prof. W. S. Boulton, and we are glad to see that this society keeps up the excellent character of its publication. There are some illustrated natural history notes contributed by various members; Mr. L. J. Wills has a well illustrated article on 'The Structure of the Lower Jaw of Jurassic Labyrinthodonts'; Prof. E. W. Carlier writes on the 'Post Pericardial Body of Skate'; the Editor describes an Esker at Kingswinford; Messrs. J. L. Haughton and D.

Hanson give ' Observations on the Transit of Venus,' and Mr. W. H. Foxall, the Hon. Secretary, has three papers, viz. :—' The Drainage of Shenston Vale ' ; ' The Geology of the Eastern Boundary Fault of the South Staffs. Coalfield,' and ' History of Endowment of Research Fund.' The publication is well illustrated.

A RARE HYMENOPTERON.

In *The Lancashire and Cheshire Naturalist* for June (which is a particularly good number) Mr. J. Ray Hardy describes a rare insect, captured near Hollingworth, Cheshire, in July, 1916. It was found among some black ants. He says, ' It is evidently a rarely met with Hymenopteron belonging to the Dryinidæ, in which family it is placed under the name

Dicondylus pedestris Curtis.

Dicondylus pedestris Curtis, by A. H. Haliday, in the " Entom. Mag.," November, 1832, page 273, and he also gives its synonyms *Dryinus pedestris* Dalm., and *Dryinus formicarius* Dalm., as given in Dalman's " Analecta Entomologica "—a work I have not seen ; but otherwise makes no comment about it. I note also that Gray places this species in his " List of Hymenoptera " (Brit. Mus., 1853), as *Gonatopis pedestris* Haliday (=*Gon. formicarius* Dalman). After long and careful search through all the literature relating to Hymenoptera at my command, I at length found the insect figured in a paper on " Notes on the Oxyura," by Francis Walker, in *The Entomologist* for January, 1874, page 27. Unfortunately, there is not the least reference to it in the text of this paper.

Naturalist.

It is not mentioned in Curtis's "British Entomology," but as Curtis is the author of the name it may possibly occur in his "Guide to an arrangement of British Insects"—to which I have failed to gain access, as it does not appear to be in any of our Manchester Libraries. I should therefore esteem it a favour if any of my readers could furnish any information either from Curtis's work or from their own personal knowledge of the insect itself, as I am desirous to know something of its life history.'

REFRACTORY MATERIALS.

With the above heading the Faraday Society has reprinted from its Transactions, a General Discussion on the subject, held in November last.* It has remained for the war seriously to bring home to us the necessity for paying regard to the scientific study of Refractory Materials, among many others. The Faraday Society has devoted a long meeting to the discussion of this subject, and, with many written contributions by specialists, has issued a full report thereon. This includes contributions by Sir Robert Hadfield, Prof. W. G. Fearnsides, Dr. A. Strahan, Mr. J. Allen Howe, Mr. Cosmo Johns, Dr. P. G. H. Boswell, Prof. Cronshaw and others. The volume may safely be said to form a useful and up-to-date account of the scientific side of refractory materials, from almost every point of view. There are several plates, tables, and a bibliography.

YORKSHIRE NATURALISTS' UNION.

By the kindness of our friends at Wakefield, the date of the Annual Meeting of the Yorkshire Naturalists' Union has been altered to December 8th, in order to ensure the presence of the President, Sir Archibald Geikie, O.M., F.R.S. We are informed that the title of Sir Archibald's address will be 'A Yorkshire Rector of the Eighteenth century,' and we have reason to believe that he will deal with the important work of a Yorkshire Geologist.

NUTRITIVE VALUE OF EDIBLE FUNGI.

In *The Journal of the Board of Agriculture* for July is an article with the above heading. It is stated that 'Suggestions are frequently received that the use of edible fungi should be encouraged, particularly in times of shortage like the present. Such suggestions are largely founded on the widespread belief that the nutritive value of mushrooms and other edible fungi is very great. It is now known that this is not the case, and in view of the well-known risks attaching to the use of fungi as food by persons not very well acquainted with the plants, it is desirable that the true facts as to their place in the diet

* 189 pp., 12/6.

should be more widely understood. The idea that fungi are highly nutritious originated in the fact that analyses have shown them to contain a relatively large proportion of nitrogenous compounds. It was formerly customary to assume that the total amount of nitrogen present represented " crude Protein," the valuable formative constituent of such foods as meat, fish, beans, etc., hence it is chiefly as a proteid or " flesh-forming " food that fungi have been recommended. Summarising the results obtained from the analysis of various edible fungi, and comparing them with other foods, it is obvious that mushrooms can in no sense be regarded as substitutes for flesh-forming foods such as meat. It may be noted that the common mushroom (*Agaricus campestris*) is richest in proteid substances of all the species examined. Even so, however, its proteid content is no higher than that of cabbage or potatoes, and in total nutritive value it is far inferior to the latter on account of its poorer carbohydrate content.'

BRISTOL NATURALISTS.

We are glad to see from the last three parts of the Proceedings of the Bristol Naturalists' Society that our Bristol friends pay particular attention to their district, though occasionally the papers are of more general interest or do not bear upon the Bristol area. Among the contributions we notice ' Two Blastoids from Somerset ' (which have found their way to London), by Dr. F. A. Bather ; Bristol Diptera, by H. J. Charbonnier ; Silurians of the Eastern Mendips, by Prof. S. H. Reynolds ; Bristol Botany, by Miss I. M. Roper ; Bird Notes, by Mr. D. Munro Smith ; Lists of Local Geological Publications, 1875-1913, by Prof. S. H. Reynolds and Mr. J. E. Livingstone ; ' Fifty Years of Bristol Botany,' by Mr. J. W. White ; ' Fifty Years of Bristol Entomology,' by Messrs. A. E. Hudd and G. C. Griffiths ; ' Fifty Years of Bristol Zoology,' by Mr. H. J. Charbonnier ; ' Fifty Years of Bristol Geology,' by Prof. S. H. Reynolds ; List of Bristol Mycetozoa, by Miss A. Fry, and the Carboniferous Limestone of Over and Tytherington, by Prof. Reynolds and Mr. D. E. Innes.

THE NEGLECT OF SCIENCE.

We have received a valuable Report of a Committee dealing with the above subject, signed by Sir E. Ray Lankester, Mr. A. S. E. Ackermann and Prof. R. A. Gregory. From this we learn that ' Several communications have been received from organizations concerned with professional aspects of education, and the Committee has been able to afford assistance to such bodies in the way of providing information. The Committee is of the opinion, however, that its activities are best limited to the advocacy of adequate attention to the natural sciences in the public schools and at Oxford and Cambridge, and to

securing for them a prominent place in the examinations for the public services. These matters define clearly the work of the Committee, and are not the objects of any other organization. While, therefore, the Committee is aware of desirable changes in the position of science in schools of all grades and in national affairs generally, it believes that the best means of effecting reforms in all directions will be the securing of adequate attention to science in the education of students at the public schools and Universities where a large number of the most influential members of the community receive their early training. Its activities will be continued until these ends have been attained.'

THE NEED FOR SCIENCE

We have also received a pamphlet entitled 'The Need for Science in Education,' written by Sir E. Ray Lankester. In this he states:—'We believe in the great importance of science and the scientific method—not merely for the advancement of the material well-being of the community, but as essential to the true development of the human mind and spirit. And for this reason we think that there is a need for the very serious and determined introduction of the study of the natural sciences, their history and method, as an integral part of the education given in all schools, but more especially in those where the youth of the well-to-do classes who will succeed to positions of influence in the State, in industry and commerce, are enabled to give ample time to the acquirement of knowledge and the discipline of their minds.'

IN EDUCATION.

'The mass of detailed knowledge of nature arranged so as to exhibit "the causes of things," grouped under larger and smaller "laws of nature" or general statements, is nowadays arranged in a series of separate branches—the several "sciencies" known as physics, chemistry, astronomy, geology, botany, zoology and anthropology. It is of the utmost importance that in school education as much as half the pupil's time should be given to gaining a knowledge of the main facts revealed by these sciences and to personal observation of the experiments and methods of reasoning by which they have been demonstrated. These studies must not exclude but be accompanied by the study of the English language and literature, and of univeral history, and by the acquirement of facility in the use of simple mathematics and of at least two foreign languages.'

THE LIFE OF NATURE.

Dr. J. Arnold Lees writes:—A sophic nature-lover, Richard Higgs, better known to Lancashire than to Yorkshire naturists, said an old thing newly but extra-finely the other day. Quoting

the French Scientist's calculation that, in cultivating the soil, for every single effort put forth by man and beast, Nature gives an effort equal to Five hundred ! he asked once yet again the evergreen question : " What is ' Life ' ? . . . . The answer comes, as all Nature's teaching comes, not in the definite and clear statements (so beloved of scientific humanity), not in a mathematic formula, or a clear and logical phrase ; but slowly, vaguely and indefinitely, as the bursting seed or the opening flower, Nature tells us of life in endless forms, and the sun shows us an endless object-lesson of what life is. The West wind tells that life and immortality are one, that life is freedom, great, abounding, majestic and wonderful as the vast ocean and the immeasurable sky. The winds and the hills show that death is but a change of existence, that life is the essence of all creation." . . etc. *Verb. sap.*

THE GREEN WOODPECKER.*

O Yaffle ! flinging sorrow to the wind,
Born forester, half outlaw, green o' garb
Like Sherwood's Robin, garnet crest a-barb ;
Your ' char ' chant makes a Message to my mind.

Each tap's a spell since wood-deaf ears it glads,
As ' screeve ' or bore you, by instinctive rule,
Beech balk, the pine's mast, beam-tree rod : the tool
Your bill !—in one a ' nauger,' mallet, adze.

Yet, half a parrot, clench you yon' high bole—
The woodman's cheery mockster. Mark ! how fast,
After each dull deep axe-thuck to the bast,
We hear you, Up there ! chorussing his rôle.

Why do we rank you higher than most that sing—
If but the rare, true Woodlark be except—
When at one craft and only, you're adept ?
Is't that you corral Sorceries 'neath your wing ?

O ! Yaffle, Yaffle, on a Yoreland bough—
Which more of late you've favoured—tell me this :
Why, for all nature-lovers, like a kiss
Inviting more, are you ? that Troth may trow.

' Associations ' count in every sphere—
' Birds of a feather flock,' the saw-rhyme says :
Then may your tactic 'liven all our days—
Swink at the woodfall's lighter with you near !

S.M. F.A.L.

* 'Communicated' by the late S. M., Forester; versed by F. Arnold Lees.

A RARE TYPE OF BRONZE-AGE WEAPON FROM LINCOLNSHIRE.

T. SHEPPARD, M.Sc., F.G.S.

THE specimen figured herewith (page 282) is a socketed dagger, an unusual type of Bronze-age weapon, which has recently been found in north Lincolnshire. It is now in the Municipal Museum in Hull, which previously contained nothing quite of this type, nor is there one in the Museum at Driffield. The specimen is $6\frac{3}{8}''$ in length, $\frac{7}{8}''$ across the blade, $1\frac{1}{4}''$ wide across the mouth of the oval socket, which measures $1'' \times \frac{3}{8}''$ inside, the socket being $1\frac{3}{8}''$ in depth.

As will be seen from the illustration the dagger has a straight and double-edged blade. Sir John Evans, in his book on 'Ancient Bronze Implements, etc., in Great Britain,' shows a somewhat similar example (fig. 240), $5\frac{3}{4}''$ long, found with a hoard of socketed celts, etc., near Worthing. He also figures another example (fig. 241) found with a hoard near Burwell. From the well-known Heathery-Burn Cave in Durham, is figured still another example (fig. 242), and he states this 'presents the remarkable feature of having upon each face of the socket six small projecting bosses simulating rivet heads.' Usually the shaft of these daggers is bored for the reception of a rivet. On each side of the North Lincolnshire example are two projections, resembling the heads of rivets, but they are merely ornamental, and the shaft is not pierced for the rivets. Of course, these may have served as knobs to assist in secure shafting.

These socketed daggers are very scarce in Great Britain, though more abundant in Ireland. They have been recorded for Glamorgan, Anglesea, Denbighshire, Cornwall, Dorset, Kent's Cavern (Torquay), the Thames, and Suffolk, in addition to the localities already mentioned. A plaster cast of this specimen has been sent to the Scunthorpe Museum.

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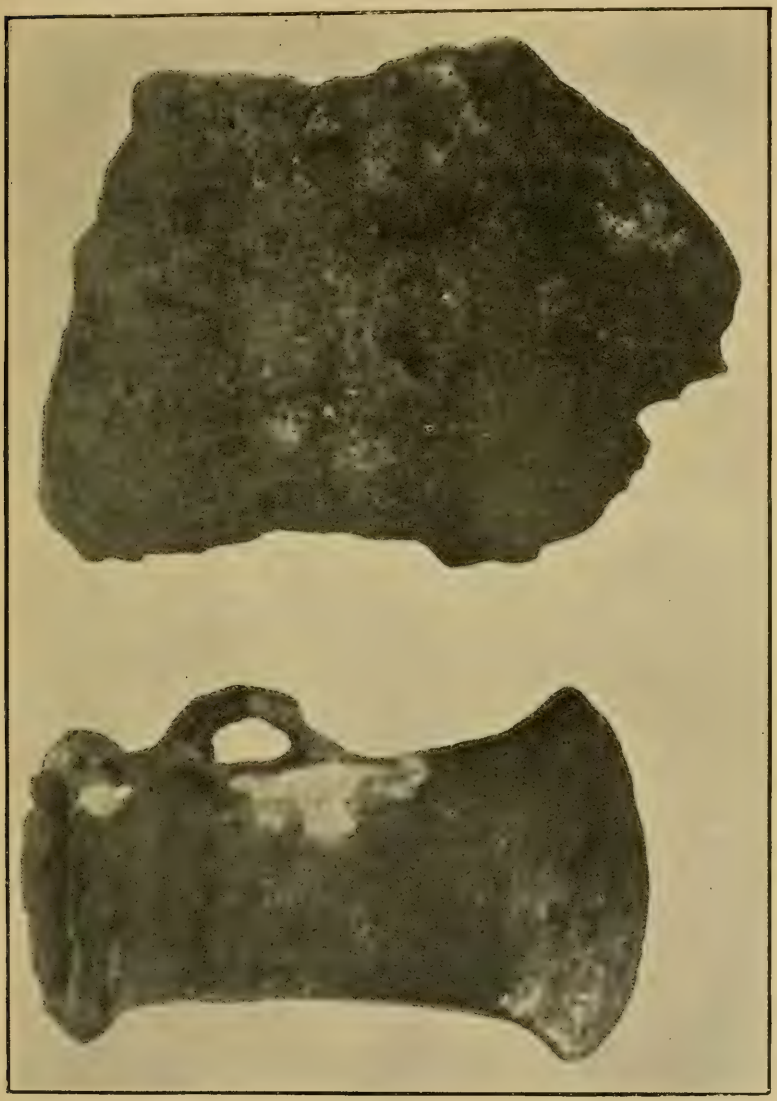
MORE BRONZE-AGE RELICS FROM SCARBORO'.

T. SHEPPARD, M.Sc., F.G.S.

REFERRING to the notes in *The Naturalist* for May, relating to the hoard of bronze implements found at Scarborough, there has been a discussion in the Scarborough press in reference to the specimens coming to Hull. This has had a somewhat unexpected result. A reader of the paper, who had found a very fine axe, and also a large mass of bronze, seemed to think that these specimens should be preserved at Hull, with the

Socketed Dagger from North Lincolnshire. Naturalist,

remainder of the find, and this has since been accomplished. The axe head is one of the most perfect that has been found



Bronze socketed Celt and mass of Bronze from Scarborough (actual size).

in the hoard, and in type somewhat resembles No. 10, plate 2 (*The Naturalist*, May). It is $3\frac{1}{4}''$ in length, slightly over $1\frac{1}{2}''$ across each way at the top ; the loop is preserved, the collar

extends to five-eights of an inch from the top, and three parallel lines extend, at each side of the collar, about half-way down the axe, though in each case the centre line is the longest. The cutting edge is well hammered out and sharpened, and is $2\frac{1}{4}$" in length. The lines on each side where the moulds met are sharp and clear, and the central ridge inside the socket on each side of the axe extends to the apex. The specimen is illustrated on page 283.

The piece of bronze represents nearly half of a 'cake' of metal, is flat at the top, convex beneath, and has evidently been formed in a crucible. It is $3\frac{1}{2}" \times 2\frac{1}{2}"$ and $1\frac{1}{4}"$ thick, in the middle, and weighs 24 ozs. troy. This specimen confirms the opinion expressed in the notes already referred to, that the Scarborough find represents a founder's hoard.

Bronze 'cakes' of this kind have previously been recorded with hoards of socketed axes, etc., from Cornwall, Somerset, Sussex, Surrey, Hertfordshire, Essex, Kent, Lincolnshire, Yorkshire and Durham.*

——: o :——

The Numismatic Circular for July-August contains part of a paper on the Fauna and Flora of the Coin-types of ancient Rome.

Some visitors were gazing at the head of a Canadian Moose in a Yorkshire museum recently, when one was heard to exclaim, 'Lawks, if that's a moose, what must their rats be like!'

The Geological Magazine, No. 637, contains an excellent portrait of Dr. Alfred Harker, F.R.S., with Memoir. Dr. Harker is a Yorkshireman, and a past-president of the Yorkshire Naturalists' Union.

Part 6, (pp. 625-691) concludes the *Bibliography of British Ornithology*, by W. H. Mullens and H. Kirke Swann (Macmillan & Co., 6/-). With it is issued a prefatory note, list of publications consulted, etc. In its complete state, this forms a valuable work of reference.

We have received a copy of the *South African Railways and Harbours Magazine* for June. It contains many articles of interest, but to naturalists 'The Natal Museum,' by Dr. E. Warren, is of especial value. It is illustrated by numerous reproductions of photographs of the larger African mammals.

The Journal of the Northants Natural History Society and Field Club for 1916 includes many papers bearing upon the district. Among the more interesting we notice 'The Snail and its name,' by A. Wallis; 'Early Man in Northamptonshire,' by T. J. George; 'The River System of Northamptonshire,' by Beeby Thompson, and the usual useful meteorological reports.

Writing to the *Yorkshire Post* in reference to the Caterpillar plague recorded in various parts of the county in June, Mr. G. T. Porritt points out that the caterpillars are those of the Antler Moth. The insect is more or less common every year in most parts of Yorkshire and the North of England generally, especially on the grassy parts of the moorlands, but fortunately rarely appears in sufficiently large numbers to cause noticeable damage.

* See Sir J. Evans's 'Ancient Bronze Implements, etc., of Great Britain.'

THE MOSSES & HEPATICS OF DENBIGHSHIRE.

D. A. JONES.

THE part of the county of Denbigh which lies to the south-east of the Berwyn Mountains and Cyrn y brain forms a well-defined rectangular area about twenty-seven miles long and ten miles broad. It is divided into two nearly equal sections by the River Dee—one to the north-east and the other to the south-west of the river.

These notes deal mostly with the distribution of Mosses and Hepatics in the former portion, to which are added a few records for Llandegla and Glynceiriog, north and south of the area respectively.

The district consists of hills and dales. The land rises gradually towards the north-west. Above Llangollen it reaches an elevation of 1,648 feet in the fine Eglwyseg Rocks which are continued in a northerly direction as far as World's End. The latter contains some of the most prolific rocks in cryptogams in the county. To the north-east of this part the land attains its highest point at Cyrn y brain, 1,839 feet. Again, the hills that lie to the north-west of Wrexham have an altitude of over 1,000 feet at Bwlchgwyn increasing to 1,500 feet on Minera Mountain. Beyond this high ground a wide stretch of moorland covered with heather extends as far as World's End to the south-west.

The vales of Llangollen and Gresford, watered by the Rivers Dee and Alun respectively, occupy opposite ends of the district.

Nant y Ffrith is a deep ravine running from Ffrith to Bwlchgwyn. Its caves and miniature waterfalls are very beautiful. The outcrops of Millstone Grit and limestone produce a varied and interesting moss and hepatic flora. Some of the rocks forming the right side of the basin of one of the larger waterfalls are lined with extensive cushions of *Weisia curvirostris* var. *commutata*, covered with hundreds of capsules. The higher rocks lower down the river and on the same side form a substratum on which great masses of *Metzgeria pubescens* grow, a plant not elsewhere recorded for the Principality. The Sandstone caves—floors and sides—are literally covered with cryptogams—*Brachythecium velutinum* in close green and silky sheets, *Webera proligera*, *W. albicans*, together with *Plagiochila asplenioides* var. *humilis*, *Cephaloziella stellulifera*, *Calypogeia arguta* and other minute hepatics. The stream that flows through the ravine forms the boundary between the counties of Denbigh and Flint.

Geologically, the district shows the three principal divisions of the Carboniferous Formation. They are :—

1917 Sept. 1.

1. The Coal Measures.

These are represented at Acrefair, Ruabon and Wrexham. The following mosses and hepatics are the most characteristic species of the flora of this formation :—

Shales.—Dry and barren—*Catharinea undulata, Polytrichum piliferum, Dicranella heteromalla, Glyphomitrium polyphyllum, Rhacomitrium fasciculare, R. heterostichum, Ceratodon purpureus, Alicularia scalaris, Pellia epiphylla, Diplophyllum albicans, Scapania compacta.*

Clays.—Heavy and retentive of moisture—*Catharinea undulata, Dicranella varia, D. Schreberi, Fissidens taxifolius, Tortula ambigua, Barbula cylindrica, Webera carnea, W. albicans, Aneura pinguis, Blasia pusilla, Pellia epiphylla, Chiloscyphus pallescens* and *Calypogeia trichomanis.*

Sandstone.—Dry and unproductive—*Tortula muralis, T. ruraliformis, Barbula sinuosa, Aulacomnium androgynum, Brachythecium velutinum, Hypnum Patientiæ, Alicularia scalaris* and *Cephalozia bicuspidata.*

The spoil banks from coal-pits are very barren, *Ceratodon purpureus, Webera nutans, Bryum capillare* and *B. argenteum* being met with here and there.

2. Millstone Grit Formation.

This consists of a wide expanse of heathery moorland. It generally occupies the highest ground and has therefore a different flora—*Sphagnum intermedium, S. cuspidatum, S. papillosum, Campylopus flexuosus, Dicranella heteromalla, Rhacomitrium heterostichum, R. fasciculare, R. lanuginosum, Webera annotina, W. proligera, Hypnum cupressiforme, Alicularia scalaris, Lophozia attenuata, L. Floerkii* var. *Naumanniana, L. bicrenata, L. excisa* and *Diplophyllum albicans.*

3. The Carboniferous Limestone

of Minera and Eglwyseg Rocks. The strata all dip to the north-east, the Carboniferous Limestone being the lowest member of the formation. The moss flora on these rocks is rich, especially in the damper spots—*Seligeria pusilla, Ditrichum flexicaule* and var. *densum, Tortula aloides, Trichostomum crispulum* and var. *elatum, Barbula rubella* var. *ruberrima, B. recurvifolia, Funaria calcarea, Philonotis calcarea, Orthotrichum cupulatum* and var. *nudum, Anomodon viticulosus, Thuidium Philiberti, Camptothecium lutescens, Hypnum commutatum, H. falcatum, H. molluscum, H. chrysophyllum, Metzgeria pubescens, Pellia Fabbroniana, Lophozia turbinata, Scapania aspera, Cololejeunea calcarea* and *Marchesinia Mackaii.*

At the foot and to the east of the Carboniferous Limestone which appears between the above moorland formed by the

Millstone Grit and the hills of Cyrn y brain, lies a patch of rock which is supposed to be Old Red Sandstone, together with grey sandstones and cornstones, concretions containing some limestone. It contains no fossils, so that its age is rather uncertain.

4. The Denbighshire Grits

are represented in the Llangollen District. These consist of an extensive series of shales, flagstones, sandstone and grits, and are marked by the absence of limestone. They are of Lower Wenlock and Upper Silurian age. They cover an extensive tract of country, mostly moorland, in which the Heather association is dominant—*Dicranum scoparium, Campylopus flexuosus, C. pyriformis, Rhacomitrium fasciculare, Alicularia scalaris, Gymnocolea inflata* and *Lophozia ventricosa.*

5. Ordovician or Lower Silurian.

These comprise the imposing hill called Cyrn y brain, which lies to the west of the Carboniferous Limestone. It is surrounded by wettish heathery moorland. The commoner mosses and hepatics are well distributed over this area and grow in quantities, especially those belonging to the genera *Sphagnum, Polytrichum, Campylopus, Rhacomitrium* and *Grimmia.* In Merionethshire, *Grimmia arenaria* is generally associated with *Coscinodon cribrosus* and *Grimmia Stirtoni* on this formation, but hitherto it has not been met with in the district, although the last two mosses occur. The other species characteristic of the flora of this ground are:—*Ceratodon purpureus, Webera nutans, Bryum pseudo-triquetrum, B. capillare Brachythecium populeum, Plagiothecium elegans, P. denticulatum, Scapania compacta, Alicularia scalaris, Lophozia quinquedentata, Marsupella emarginata* and *Diplophyllum albicans.*

The corticole species are rare in the general district referred to, on account of the atmospheric pollution by noxious products resulting from the incomplete combustion of coal. These products are discharged from the chimneys of coal mines and steel works, as well as from numerous domestic fires. Mr. J. A. Wheldon, in his excellent paper on the Lichens of South Lancashire, states that the burning of coal is accompanied by the liberation of sulphur dioxide (SO_2), which becomes oxidised in the atmosphere into sulphuric acid (H_2SO_4), and brought down in the rain. Such sulphur compounds as sulphur dioxide and sulphuretted hydrogen produce injurious effects on vegetation. He also states that soot has a very deleterious effect on most arboreal plant growths. As rain is carried down the tree trunks, it becomes more and more charged with acid impurities, which must prove fatal to young and tender plants. A film of soot forming on the surface of the bark must also

interfere with the germination of the spores of mosses and hepatics. The more delicate species of these cryptogams suffer to the extent of becoming extinct under such conditions. These atmospheric impurities, however, affect the vegetation of the country to the west and north-west of Llangollen to a less degree than to any portion to the east of the town, because of the proximity of the latter to the Ruabon and Wrexham manufacturing and more populous centres. Such bark-loving species as *Orthotrichum Lyellii*, *O. affine* and *O. stramineum* occur very sparingly in the former localities. In the Wrexham area Nant y Ffrith produces the following corticole species in small quantities:—*Ulota Bruchii*, *U. crispa*, *Lophocolea heterophylla*, *Frullania tamarisci* and *F. dilatata*. The purer air of the higher altitude at which this ravine stands, the shelter and protection due to its depth, as well as the greater amount of humidity that prevails, tend to counteract to some degree the unfavourable atmospheric conditions that cause the deterioration of plant growth in the district. It may be of interest to mention here that William Wilson, of Warrington, in his Bryologica Britannica (1855) records *Orthotrichum tenellum* for Gresford Vale. The conditions to-day do not favour the occurrence of this beautiful little moss in that locality.

The average rainfall in inches from 1880 to 1884 for the following places in the district is as follows:—

Ruabon (Wynnstay)	34·87
Llangollen (Plâs Beryn)	44·72
Wrexham (Pack Saddle Reservoir) ..	33·32
,, (Cae Llwyd Reservoir) ..	43·81
,, (Plâs Power)	36·55
,, (Brymbo)	33·62
Rossett (Trevalyn Hall)	29·08
Chirk (Cefn-y-Wern)	35·45

The following list contains records of mosses gathered in the county of Denbigh by the late Professor Barker, of Buxton. These records were compiled from MS. belonging to him. A list of Hepatics collected by the same bryologist in the Llangollen district is also included. This collection was examined by Mr. Ingham, secretary of the Moss Exchange Club, who kindly sent the records to the writer. The following excursions by Prof. Barker in the county are represented by the figures 1–10. A number quoted after each species, therefore, refers to the locality in which that species was collected by Prof. Barker. For records not followed by a number the author is responsible.

(1) Near Colwyn Bay and Bettws y Coed (V.C. 50), August and September, 1899.

Mosses collected and noted in the neighbourhood of Llangollen (V.C. 50), August 14th–29th, 1900:—

(2) *Via* north side of Geraint—Bryn Mawr—Vivod—Berwyn—across Chain Bridge—Valle Crucis Abbey—Llangollen—Wrexham Road (1½ miles)—Llangollen. August 14th.

(3) *Via* east side of Castell Dinas Brân—Eglwyseg Rocks at end of Panorama Walk—North, along top of ravine which goes back and ends near a little plantation—down ravine—road West of Castell Dinas Brân—footpath between that and Dinbren Hall—Llangollen. August 15th.

(4) Glyndyfrdwy Station across River Dee—along road on north side to Chain Bridge—across River Dee—Holyhead Road—path, south bank of River Dee—Llangollen. Aug. 16th.

(5) Road to Glynceiriog to near summit—to left over heather and along old road on ridge—old quarry near a house—further along ridge—descent towards Pen y Coed—along road south of latter—Llangollen. August 17th.

(6) Llangollen to Geraint—across Holyhead Road near Llangollen. August 19th.

(7) Llangollen to World's End by footpath east of Dinbren Hall, and road west of Eglwyseg Rocks—east across heather to Watershed, then along parts of Rocks nearest World's End and back by same road to Llangollen. August 20th.

(8) Along south side of Geraint to road from Vivod, across to Blaen y Bachau, to Marsh—back by Blaen y Bachau to Llangollen. August 21st.

(9) Castell Dinas Brân. August 22nd.

(10) A list of Hepatics collected by Professor Barker in the neighbourhood of Llangollen, August 14th–29th, 1900.

The following list contains :—

			New County Records.	
	Species and sub-species.	Varieties.	Species and sub-species.	Varieties.
Mosses ..	229	48	97	34
Hepatics .	61	7	33	6

Many of the following records were included in the list of Mosses and Hepatics for Wales, sent by the writer to the Moss and Hepatic Census Catalogues of the Moss Exchange Club. They were published under their vice-commital number in those catalogues, but the localities are now recorded for the first time. The records in the list mentioned above which were new, and others made subsequently, are denoted by an asterisk (*).

Sphagnum cymbifolium Ehrh., 1 ; Cyrn y brain, Nant y Ffrith, Minera.

S. papillosum Lindb. ; Minera, Cyrn y brain.

S. molluscum Bruch ; Cyrn y brain.

S. cuspidatum (Ehrh.) W., var. **falcatum* Russ. and var. **plumosum* Bry. germ. ; Cyrn y brain.

Sphagnum recurvum var. **mucronatum* (Russ.) W.; Minera, Nant y Ffrith, Cyrn y brain. Var. **amblyphyllum* (Russ.) W.; Cyrn y brain, Minera.
**S. Girgensohnii* Russ.; Minera.
S. subnitens Russ. and W.; Nant y Ffrith, Cyrn y brain.
**S. quinquefarium* (Lindb.) W.; Nant y Ffrith.
**S. subsecundum* (Nees) Limpr., 1.
**S. contortum* Schultz, 1.
**S. inundatum* (Russ.) W.; Minera, Cyrn y brain.
**S. rufescens* (Bry. germ.) Limpr.; Minera.
Andreæa Rothii var. *falcata* Lindb., 1.
Tetraphis pellucida Hedw., 1; Nant y Ffrith, Minera, Gresford.
Catharinea undulata Web. and Mohr, 1, 5; Minera, Wrexham, Nant y Ffrith.
**Polytrichum nanum* Neck.; Nant y Ffrith.
P. aloides Hedw., 1, 6, 8; Nant y Ffrith, Cyrn y brain.
P. urnigerum L., 1, 5; Minera.
P. piliferum Schreb., 9; Wrexham, Minera, Eglwyseg Rocks, Cyrn y brain.
P. juniperinum Willd., 3, 7, 8; Cyrn y brain, Minera.
P. strictum Banks, 1.
P. formosum Hedw., 4, 5, 6, 7; Cyrn y brain, World's End, Nant y Ffrith, Minera, Glynceiriog.
P. commune L.; Cyrn y brain, Minera.
Pleuridium axillare Lindb., 3, 4, 5, 6; Nant y Belan.
**P. alternifolium* Rabenh.; Brynteg, Wrexham.
Ditrichum flexicaule Hampe, 1, 3, 7; Nant y Ffrith, World's End, Berwig, Minera. Var. *densum* B. and S., 1, 3, 7; Berwig, World's End.
**Seligeria pusilla* B. and S.; Bwlchgwyn (Watson, Duncan and Jones), World's End.
**S. recurvata* B. and S., 2.
Ceratodon purpureus Brid.; common throughout the district.
Cynodontium Bruntoni B. and S., 1, 9; Minera.
Dichodontium pellucidum Schp., 2, 7; Nant y Belan, Nant y Ffrith, Berwig, Minera. Var. **fagimontanum* Brid., 7.
D. flavescens Lindb., 1, 2, 7; Nant y Ffrith.
Dicranella heteromalla Schp.; frequent. Var. **interrupta* B. and S.; Bwlchgwyn, Nant y Ffrith.
D. varia Schp., 1, 3, 5, 7; Coedpoeth (abundant), Berwig, Nant y Ffrith, Gresford, Minera.
**D. Schreberi* Schp., 1, 4, 5, 6, 8; Gresford, Nant y Ffrith, Berwig. Var. **elata* Schp.; Gresford.
Dicranoweisia cirrata Lindb.; Ruabon, Minera Mt.
Campylopus flexuosus Brid., 1, 7; Bwlchgwyn, Nant y Ffrith, Cyrn y brain. Var. **paradoxus* Husn., 5; Nant y Ffrith.
C. pyriformis Brid., 7; Bwlchgwyn, Cyrn y brain.
C. fragilis B. and S., 8; Minera, Nant y Ffrith.

Campylopus atrovirens De Not., 1 ; Cyrn y brain.
Dicranum Bonjeani De Not., 1, 4 ; Llangollen, Berwig, Nant y Ffrith.
D. scoparium Hedw. ; common. Var. **orthophyllum* Brid., 1, 5.
D. majus Turn., 1, 2 ; Nant y Ffrith.
Leucobryum glaucum Schp., 1 ; Cyrn y brain.
**Fissidens exilis* Hedw. ; Glasgoed.
**F. pusillus* Wils. ; Nant y Ffrith.
**F. incurvus* Starke ; Glasgoed.
F. bryoides Hedw., 1, 6, 8 ; Glasgoed, Brynteg, etc.
**F. crassipes* Wils. ; Gresford.
**F. osmundoides* Hedw., 1.
F. adiantoides Hedw., 1, 3, 5, 7, 8 ; Nant y Ffrith.
F. decipiens De Not., 3, 5, 7 ; Nant y Ffrith, Minera.
F. taxifolius Hedw., 1, 7 ; Nant y Ffrith, Gresford. Eglwyseg Rocks.
Grimmia apocarpa Hedw. ; frequent. Var. *rivularis* Web. and Mohr ; Nant y Ffrith.
G. pulvinata Smith, 1, 2, 3 ; common in the Wrexham district, World's End.
**G. orbicularis* Bruch, 1.
G. trichophylla Grev., 1, 4 ; Cyrn y brain.
**G. Stirtoni* Schp., 1, 2, 4, 9 ; walls near Llandegla.
G. Doniana Sm., 1.
**G. arenaria* Hampe, 1.
Rhacomitrium aciculare Brid., 1, 2 ; Cyrn y brain.
R. protensum Braun, 1 ; Minera, Cyrn y brain.
R. fasciculare Brid., 1, 5 ; Minera, Nant y Ffrith, Cyrn y brain.
R. heterostichum Brid., 1, 2, 5 ; Minera, Cyrn y brain. Var. **alopecurum* Hübn., 1.
R. lanuginosum Brid., 1, 5, 9 ; Minera, Cyrn y brain.
R. canescens Brid., 7, 8 ; Minera. Var. *cricoides* B. and S., 7 ; Minera.
**Coscinodon cribrosus* Spruce ; found growing in mouse-like tufts on walls and rocks on a hillside not far from Llandegla.
Ptychomitrium polyphyllum Fürn., 1, 3, 5 ; Minera, Nant y Ffrith, Llandegla, Wrexham.
Hedwigia ciliata Ehrh., 1, 5 ; Cyrn y brain.
**Acaulon muticum* C.M. ; Brynteg.
Phascum cuspidatum Schreb., 4, 5, 6 ; Brynteg, Wrexham. Var. **piliferum* Hook. and Tayl., 5.
**P. curvicolle* Ehrh. ; Brynteg, Wrexham.
Pottia truncatula Lindb., 1, 3, 5, 7 ; Brynteg, Wrexham.
**P. intermedia* var. *littoralis* Mitt., 3.
**P. minutula* Fürnr. ; Brynteg, Wrexham.
**Tortula rigida* Schrad., 4.
T. ambigua Angstr., 4 ; Wrexham.

Tortula aloides De Not., 1, 6; World's End.
T. muralis Hedw.; abundant. Var. *rupestris* Schultz, 1, 2; Wrexham, Llangollen. Var. **æstiva* Brid., 2.
T. subulata Hedw., 1, 3, 5; Minera.
T. lævipila Schwaeg., 1, 3, 4, 7.
T. intermedia Berk., 1, 3, 9; Llangollen, Berwig, Nant y Ffrith, Minera.
T. ruralis Ehrh., 7; Brynteg.
**T. ruraliformis* Dixon, 1; Eglwyseg. This sub-species was gathered among the limestone scree at the base of the Eglwyseg Rocks. The leaves are distinctly narrowed at the apex and the lamina runs out into a hyaline point. It is a common plant on Welsh coast sandhills where it is often fertile.
Barbula lurida Lindb.; Colwyn Bay.
B. rubella Mitt., 1, 3, 4, 5, 6; Nant y Ffrith, Wrexham, Minera. Var. **ruberrima* Ferg.; a beautiful form of this variety occurs among the broken limestone at Berwig.
**B. recurvifolia* Schp., 1, 3; in similar situations to the last at Berwig.
B. fallax Hedw.; frequent. Var. **brevifolia* Schultz, 1, 3, 4; Eglwyseg Rocks.
**B. tophacea* Mitt.; Eglwyseg Rocks, Berwig.
B. spadicea Mitt., 1, 3, 7; Nant y Ffrith.
B. rigidula Mitt., 1, 2, 4, 7; Ffrith, Minera, World's End.
B. cylindrica Schp., 1, 2, 6; Wrexham, Nant y Ffrith.
B. vinealis Brid., 1, 4, 7; Wrexham.
B. sinuosa Braithw., 1, 4, 5.
**B. gracilis* Schwaeg., 1; a rare moss not hitherto recorded for the Principality.
B. Hornschuchiana Schultz, 1, 5, 6, 7; Ffrith, Bwlchgwyn.
B. revoluta Brid., 1, 4, 5; Wrexham, Ffrith.
B. convoluta Hedw., 1, 3, 4, 5, 6; Wrexham, Minera, World's End. Var. *Sardoa* B. and S., 2, 6.
B. unguiculata Hedw.; common.
Leptodontium flexifolium Hampe, 5; Bwlchgwyn, Nant y Ffrith.
**Weisia tortilis* C.M., 1.
**W. crispata* C.M., 1.
W. viridula Hedw., 3, 4; Berwig, Minera.
**W. calcarea* C.M., 1, 7.
W. rupestris C.M., 7; Nant y Ffrith. Var. **ramosissima* Bry. Eur., 3, 4.
W. curvirostris C.M. Var. *commutata* Dixon; Nant y Ffrith. Some of the leaves occasionally have shorter papillose cells approaching the type.
W. verticillata Brid., 3.

(To be continued).

THE GEOGRAPHICAL DISTRIBUTION OF THE MOTHS OF THE SUBFAMILY BISTONINAE.

J. W. HESLOP HARRISON, D.Sc.

XI.—THE GENUS BISTON (LEACH).

Biston strataria (Hufn.). Distribution :—Central Europe, The British Isles, Southern Scandinavia, Spain and Portugal, Morocco, Algiers, North and Central Italy, Dalmatia, South Russia and Asia Minor.

Biston comitata (Warren). Eastern Siberia, China and Japan.

Biston robustum (Butler). Japan.

Biston regalis (Moore). North India, Himalayas.

The name Biston has, unfortunately, always been misapplied, *Lycia hirtaria* uniformly being quoted as *Biston hirtaria*—a very natural mistake—for Leach included *Lycia hirtaria* and *Biston strataria*, as well as *Amphidasys betularia*, within his genus. Very early in the ' thirties,' however, both Stephens and Westwood restricted the name to *strataria* which, in consequence, becomes the type and carries with it the additional species cited above ; and, in truth, comprising these forms the genus is a very natural one.

Just as when one throws a stone into a pool, of the ripples formed, the furthest away from the centre of disturbance or dispersal is the oldest, so *B. strataria*, located thousands of miles away from what we shall demonstrate to be the metropolis of the genus, is the most primitive species ; this fact its comparatively slight development of sexual dimorphism confirms.

Indeed, so little has the physiological affinity between our familiar *B. strataria* and the genus *Amphidasys* as exemplified by *A. betularia* been diminished, that hybrids between them have been successfully reared. Nor is the morphological difference between them very striking, the only feature of any importance being the absence in *Biston* of the posterior middle tibial spurs. Now, as there exists no similar pair of species within the groups, we must assume that *Biston*, in a form not differing widely from *strataria*, arose from some exponent of the *Amphidasys* of the *A. betularia-cognataria* type by a mutation resulting in the loss of the second pair of spurs.

At first sight, we might venture upon the conjecture that this may have occurred at any station in the European habitats common to the two insects, but to any adoption of this view many serious objections may be advanced. Amongst them there is none greater than the fact that, of the two significant *betularia* forms, *B. strataria* appears to be nearer the Palætypical insect, *i.e.*, *A. cognataria*, and this, as we have seen previously, is absent from Europe and, furthermore, has its

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headquarters in Eastern Asia; secondly, the genus *Biston* reaches its highest pitch of development in Asia; thirdly, there are no true Bistons in the intervening tracts in Asia as there would have been infallibly had *Biston* been of European, and therefore of recent, evolution; lastly, had *Biston* originated in Europe it is exceedingly difficult to see how *strataria* could have reached Algiers and Morocco in the limited time at its disposal with the causeways in their present broken-down condition.

In truth, all of these arguments point unwaveringly to one conclusion, and that is that *Biston*, like all its immediate allies, is a genus of far Eastern antecedents. Many facts of small import singly (some of which have been stated), but of compelling force when in bulk lead us to that decision.

Having thus, in our own minds, fixed its home in the far East, we must now determine when it appeared. Its failure in America gives us a starting point. Had it been a dweller in the old Miocene continent then, of a surety, we should have found it there. Again, *Phigalia* has been derived from some link between *Amphidasys* and *Biston*, as many characters, pupal, antennal and otherwise suggest, and *Phigalia*, as we know managed to reach America by the Northern route; whence the necessary conclusion is that *Biston* came into being at some time between the close of the Miocene Period and times when the Northern path was under such climatic conditions as allowed *Phigalia* to pass but prevented *Biston*, a genus more fastidious in its climatic requirements. These times, with due respect to its inability to pass to America, were not long prior to the middle of the Pliocene Epoch.

Additional evidence of quite a different type gives ample confirmation of this judgment. Japan, as we see above, produces one endemic species so that the genus cannot have been produced since Japan became an island. Moreover, it has crept into India, which suggests that it passed when the Himalayas were less of a barrier than at present and, lastly, we find it in Africa. From this evidence, built up link by link, but one conclusion is tenable, and that the same as arrived at before, that *Biston* put in an appearance in the first half of the Pliocene Period.

Couple the facts of its occurrence in North Africa and Spain with its Eastern origin, and we perceive that, in our own *B. strataria*, we have a representative of the old familiar Oriental, as opposed to the later Siberian migration, which, in those early times, whether by direct or by devious paths, was a weighty factor in the populating of Europe.

Unless we encounter here a case of converging evolution, the nearness of *B. robustum* in the female sex to the genera *Megabiston* and *Lycia* would indicate that *B. robustum* has

assumed that peculiar state of sexual dimorphism before it reached Japan. Now this observation brings it into contact with *B. comitata* and its Indian relative *B. regalis*, whence we glean that like many another member of Oriental stream *Biston* overflowed from the Chinese area.

Very soon, indeed, one offshoot pressed into regions with climate so propitious that it waxed great, and part attained such imposing proportions for a Geometrid that the name *B. robustum* applied to it is no misnomer. So nearly confined to the Japanese area was this section that, when in the end Japan was separated from Corea and China, within its limits was included the insect. But it was not so with the continental stock. Leaving many detachments behind, some of which in turn threw off colonies into Japan, that host spread widely, ever seeking genial climes and as it gained them ever growing larger. Finally it passed into India through the passes and gorges of the Brahmaputra valley. There, limited only by its predilections for trees of more temperate leanings, it reached a size and appearance so noteworthy as to warrant the name *B. regalis*. Its relatives in the 'old country' attained no such dimensions, and perforce have to remain contented with the less presumptious title *B. comitata*.

However, not all of the prototypical form was fortunate enough to strike in these directions of novel and stimulating conditions. Part of the original stock made a powerful thrust to the west over the Great Central Plateau which then was much better watered and not so relatively high as now, the great uplift culminating in the huge tableland of to-day not occurring until later. Soon, as it progressed, it was crowded to the south-west, due western advance becoming impossible owing to the enormous Central Sea; thence its way was across North Persia, through Armenia to Asia Minor. Onward, without cessation, always greedy of new ground, it journeyed into Balkan Area which then was one with Asia Minor. Unlike what obtains to-day, direct advance then, into and across Central Europe, was as yet impossible. The country about the Danube was too impeded; although quickly to vanish, the old lakes and morasses yet beset the land. Necessarily, our insect drove west across the future Balkan Peninsula to South Italy and Sicily and thence across the Mid-Mediterranean Subcontinent to North Africa, whence it once more invaded European soil by crossing into Spain from Morocco, for the Straits of Gibraltar had not then appeared.

Immediately a slow northward movement was initiated, and about the same time advance from the Balkans became impossible, and thus two streams were striving to occupy Europe, no doubt in those warmer days with complete success.

Scarcely was their journey thus apparently ended when

retreat followed. As with thousands of other arrivals in Europe, the oncome of the ice forced it back, further back indeed than many, for oaks, to which it is attached, are very impatient of icy soils. Once again, too, the reunited invaders were disjoined, for local glaciers in Central Europe occupied the plain, one contingent withdrawing to Spain and the other to South-eastern Europe, here outstaying the inclemencies of glacial days.

Nevertheless, the latter were not to last; warmer suns returned to smile on Europe, and in its turn the ice fell back. Again *Biston strataria* passed slowly forth, following hard on the oaks to which it was bound. Like other insects of similar diet, an example of which we met in *Poecilopsis pomonaria*, the Eastern division was able to repopulate Central Europe and Southern Scandinavia, that from Spain just reaching Britain, and penetrating to the Midlands, ere its impulse was lost by Britain becoming an island.

But this latter restricted occupation of the British Islands has not to be dismissed as a minor point; a like peculiarity is stamped on nearly all oak feeders, and suggests that all such beings repopulated Western Europe from the Spanish Peninsula. We shall not linger on the matter here, for we shall reserve it for subsequent full consideration when we take up the study of the genus *Apocheima*.

Still one more feature remains for treatment, and that is the break-down of the range of the group in Western and Central Asia. When *Biston* was advancing, Central Asia was a land totally dissimilar from that of our days. It was well-watered, less elevated and conditions were ideal for deciduous trees. Gradually, however, the Great Central Sea dried up and rains became infrequent. Hard on this diminishing rainfall the wooded areas contracted; where once oaks and similar trees flourished, nothing could succeed save drought resisting shrubs like *Eleagnus* and *Lycium*. Upon these *Biston* could not maintain itself, and thus the geographical continuity of the genus was broken. Nor was this all; great uprisings took place and from the ' Roof of the World ' eastward for many miles life for trees became hopeless. As a result existence for creatures of arboreal tendencies became impossible, and the gap was widened.

Such, too, has been the history of many cases of like discontinuity in distribution, prominent amongst which is the well-known case of the two Blue Jays (*Cyanopica cooki* and *C. cyanea*)—prominent, not because their case is unique, but because it is so well-known.

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Mr. J. Groves contributes a memoir on the late Clement Reid, with portrait, in *The Journal of Botany* for June.

NOTES ON THE SLUGS AND LAND SHELLS OF ICELAND.

HANS SCHLESCH.
Hellerup, Denmark.

In its Land Mollusca the Iceland fauna is very poor and possesses the characters of that of Scandinavia. Only two species are Arctic forms, viz., *Pupa arctica* Wall, and *Succinea groenlandica* Beck. Messrs. F. H. Sikes (Sevenoaks), and Bjarni Sæmundsson (Reykjavik), have added a good deal to our knowledge of this fauna, and have kindly provided me with lists of their finds. As the island becomes more systematically explored, however, it is probable that additional species will be found. The collections of Mr. Bjarni Sæmundsson are placed in the Reykjavik Museum; of Mr. F. H. Sikes in the British Museum, and my own in the Hull Museum.

The abbreviations of the collectors' names are the same as in my paper on 'The Icelandic Forms of *Limnæa*' (*The Naturalist*, 1917, pp. 257-259).

Genus Limax (Linné).

Limax arborum Bouchard-Chantereaux.

(= *L. marginatus* Müller).

S. Nuphlid, 1841 (J.St.), Vestmannaeyar (B.S.).
W. Stykkishólmur (B.S.), Reykjavik (B.S.).
N. Bakkafjördur (A.C.J.).

var. *alpestris* Lesson and Pollonera.

W. Hafnarfjördur, 1913 (F.H.S.).

Genus Agriolimax (Mörch).

Agriolimax agrestis Linné.

W. Reykjavik (G. & F.H.S.), Isafjördur, 1913 (H.S.).
Kaldalón in the Isafjardardjúp, 1913 (H.S.).
S. Nuphlid (10 specimens) of which the greatest was 20 mm. long (J.St.).
Járngerdarstadir in Grindavik (B.S.).
N. Halldórsstödum, Laxárdal, 1916 (F.P.).

Remarks: The most common shell-less snail; it is named 'Brekku-snigill,' and Eggert Olafsson says in his work* (p. 715), 'it is here (North Iceland), and everywhere over the country common.'

Agriolimax reticulata Müller.

W. Reykjavik, 1912 (F.H.S.).

Agriolimax lævis Müller, var. *hyperborea* Westerlund.

Recorded from Iceland by Westerlund in Synop. Moll. Extram. Scand., 1897, p. 31, as collected by Arthur Feddersen.

* Rejse igennem Island, Sorö 1772.

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Genus Vitrina (Drapernaud).

Vitrina pellucida Müller.

(=*V. angelica* Beck, *V. beryllina* C. Pfeiffer.)

W. Saudlauksdalur (E.O.), Heidalur, Kaldalón, Armula, Laugaból, all in the Isafjardardjúp, 1913 (H.S.). Isafjördur, 1913 (H.S.), Hafnarfjördurhraun (J.St.), from Stadafell to Brjámslœk (J.St.).

S. Höfdabrekka in Myrdalssandur (J.St.), Nuphlid in Reykjanes (J.St.), Grindavik (B.S.).

E. Nordfjördur, 1912 (F.H.S.).

N. Halldórsstödum, Laxárdal, 1916 (F.P.).

Remarks: Common everywhere under foliage and stones, especially in damp situations. Eggert Olafsson called it *Nerita testa subviridi, splendidissima spira duplici nigricante,* and says, 'this exquisite little mollusc, not any larger than a turnip seed, is very thin, tender and transparent—its sea-green colour is very polished.'

Genus Euconulus (Reinhardt).

Euconulus fulvus Müller.

(=*E. fabricii* Beck, *E. trochiformis* Mtg.)

W. Isafjördur (A.C.J., F.H.S. and H.S.). Heidalur, Armula and Kaldalón, 1913, in the Isafjardardjúp (H.S.).

N. Hals near Akureyri (A.C.J.).

E. Seydisfjördur, 1912 (F.H.S.).

Remarks: *Euconulus fulvus* Müller is a common snail under leaves in shady and damp places, and is probably distributed over the whole of Iceland.

Genus Hyalinia (Charpentier).

Sub-genus *Euhyalinia* Albers.

Hyalinia alliaria Müller.

W. Hafnarfjördur, 1912 (F.H.S.), Reykjavik (A.C.J.), from Stadafell to Brjámslœk (J.St.), Isafjördur (F.H.S. and H.S.).

S. Nuphlid in Reykjanes (J.St.), Járngerdarstadir in Grindavik (B.S.).

Remarks: This species is somewhat rare, lives in damp and shady places, and is easily recognised by its onion-like odour, when irritated.

Sub-genus Polita (Held).

Hyalinia radiatula Alder (=*H. hammonis* Ström).

W. Isafjördur, 1913 (H.S.).

S. Nuphlid in Reykjanes (J.St.).

N. Akureyri, 1912 (F.H.S.).

Genus Arion (Férussac).

Arion ater Linné.

W. Hafnarfjördur, 1912 (F.H.S. and B.S.).
Common on the lava-flows in the Reykjanes peninsula, 1901 (B.S.).
S. Nuphlid (J.St.).
2 specimens from Thingvellir (J.H.).
E. 'Not rare in the East' (Mohr).

var. *atra* Linné.

W. Hafnarfjördur, 1912 (F.H.S.).

var. *nigrescens* Moquin-Tandon.

W. Hafnarfjördur, 1913 (F.H.S.).
Remarks: *Arion ater* occurs probably only on the S.W. and Southern parts of Iceland.

Arion hortensis Férussac.

W. Reykjavik (B.S.).
Two specimens, labelled 'Iceland,' found 1840 by Jonas Hallgrimsson (Mörch).

Arion subfuscus Draparnaud.

N. Halldórsstödum, Laxárdal, Sudur Thingeyarsyssel, 1916 (F.P.).
W. Reykjavik (G. & B.S.).
S. Grindavik (B.S.).

var. *aurantiaca* Locard.

W. Reykjavik, 1912 (F.H.S.).

var. *fuliginea* Morelet.

W. Hafnarfjördur, 1913 (F.H.S.).

Genus Helix (Linné).

Sub-genus *Hygromia* Risso.

[*Helix hispida* L., var. *mörchi* Westerlund, recorded in error by Westerlund (Syn. Moll. Extram. Scand., 1897, p. 49, etc.) from Iceland; but he means Thorshavn, in Farce Islands (*see* Land-och Söttvatten-Mollusker från Vega-expeditionen, 1885, p. 145) by the same author].

Genus Helicogona (Férussac).

Helicogona arbustorum Linné.

E. Seydisfjördur, July 8th, 1905 (B.S.); Nes in Nordfjördur, 1911 (S. Tómasson); Nordfjördur, 1912 (F.H.S.); Bödvarsdalur in Vopnafjördur, Sept. 9th, 1898 (B.S.).
W. Isafjördur, 1913 (H.S.).

var. *alpestris* L. Pfeiffer.

(=var. *alpicola* Férussac).

E. Nordfjördur, 1912 (F.H.S.
W. Isafjördur, 1912 (H.S.).

var. *hypnicola* Mabille.

E. Islandia borealis *fide clar Servain* (Westerlund).

var. *trochoidalis* Roffiaen.

W. 1 specimen from Isafjördur, 1913 (H.S.).

Remarks: *Helicogona arbustorum* is a very common species in the East; it is probably introduced at Isafjördur, as it was only found in a garden near Stakkanes, and there in single specimens. Mohr says, 'it lives often on flanks of hills and heights.'

(*To be continued*).

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BOTTLE-NOSED DOLPHIN (*TURSIOPS TURSIO*) CAUGHT OFF WALNEY ISLAND.

H. B. Booth, M.B.O.U., F.Z.S.

Spending a few days' holiday with my family at Morecambe in mid-August, I was naturally attracted by the advertisement: 'A Large Whale on View, caught by Morecambe fishermen,' etc. On seeing the enclosure, bounded on one of its longest sides by an old fishing boat, the other three sides made up with all kinds of odds and ends, I was naturally quite prepared to see nothing more than a common Porpoise. But I was pleased to find the exhibit to be a Bottle-nosed Dolphin; a species, I believe, of somewhat rare occurrence on the English coasts. It measured 10 feet 10 inches in a straight line, and was almost exactly the length of the dray upon which it was exhibited. Possibly it may have shrank a few inches, as it was exposed to the full rays of the sun and to the wind. I mention this because when I saw it again a few days later it was quite three inches shorter. From what information I gathered it was seen in a dazed or stunned condition five miles west of the south point of Walney Island on August 8th. The fishermen managed to get a rope round the narrowest part of its body inside the flukes, and towed it in to Heysham Harbour. Naturally this procedure forced its head under the water, and soon deprived it of what little life it had left, by drowning. Before being exhibited it had been disembowelled and treated with some formaline concoction. This, together with the effect of the sun and the weather, had somewhat dulled its appearance. When first caught I was informed it was blue-black on the upper parts, shading through a beautiful grey on the sides to a shining silvery white below. The white however, did not extend so far up as to include the gape of the mouth, and to form a narrow streak above the upper lip, as I have seen it figured. From what I could learn, it was a female. The lower jaws protruded by about two inches

and contained twenty-two teeth on each side. The shorter upper jaws had twenty-three teeth on each side; or ninety teeth in all, and they extended further back into the mouth than those of the lower jaws. The teeth were worn quite flat, proving it to be adult—probably aged—and as it did not show any sign of injury, possibly the beast had succumbed to old age.

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FIELD NOTES.

ENTOMOLOGY.

Camberwell Beauty near Bradford.—On Wednesday, August 15th, I had an excellent view of a Camberwell Beauty (*Vanessa antiopa*) in the old quarries in Woodhall plantation, Fagley, near Bradford. It danced round me for quite a couple of minutes so that I saw it perfectly.—HERBERT E. WROOT.

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MOLLUSCA.

Discovery of *Hygromia striolata* in Nottinghamshire.—The inexplicable apparent total absence of this species from Nottinghamshire has been frequently remarked upon by the students of geographical distribution. This blank in the Catalogue of Notts. species has now been filled up by Mr. T. H. Chambers of Leeds, a diligent and enthusiastic conchologist, who has recently collected a number of living specimens at Worksop and also in the vicinity of Newark.—JNO. W. TAYLOR, Aug. 18th, 1917.

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REVIEWS AND BOOK NOTICES.

Neolithic Dew-Ponds and Cattle-ways, by **A. J.** and **G. Hubbard.** Longmans, Green & Co., 116 pp. Excepting that the words 'second edition' are altered to 'third edition,' and the date 1907 is altered to 1916, and the printers' imprint is in different type, this 'third edition' seems in all respects similar to the second edition, which was reviewed in these columns for September, 1908, p. 354. The prefaces to the 1st and 2nd editions are reprinted; no preface to the third edition being given. That a third edition of a work of this kind (more local in its scope than indicated by the title) should be called for, is evidence of its popularity.

Microscopical Determination of the Opaque Minerals: an aid to the study of Ores, by **J. Murdock.** New York and London (Chapman and Hall, 165 pp., 9/6). The Author is 'Geologist, Secondary Enrichment Investigation,' and his book is surely systemization and classification in perfection. By the aid of thumb-cuts at the tops of the pages, reference is readily made to the sections devoted to Gray, White and Coloured minerals. The right-hand sides of the pages of these sections are cut away to indicate various colours, hardnesses, etc.; the right-hand sides being further cut to show 'Eff. HNO_3,' 'No Eff. HNO_3, HNO_3, Neg,' etc., the pages on each of these subsections containing details of the

minerals coming under the respective sub-headings. The Preface and Introduction explain the scope of the work, and when these have been mastered, there is no doubt the book will be of service to the practical worker. Nine and sixpence seems sufficient for 166 pages, but no doubt a fair proportion goes to the person who has had to cut so many pages in so many different ways.

A Pocket Handbook of Minerals, by **G. M. Butler.** 2nd edition. New York and London: (Chapman & Hall), 311 pp. 11/6. This handbook is by the ' Professor of Mineralogy and Petrology and Dean' at the University of Arizona, and is ' designed for use in the field or class room with little reference to chemical tests.' It deals with the various minerals under the heads of Name, Composition, Hardness, Lustre, Colour, Streak, Cleavage, etc. ; there is a good index and elaborate tables at the end. Illustrations are given of typical crystals and minerals, one being of ' Arazonite, Cumberland, England.' The volume is printed on very thin paper, on small-sized pages with rounded corners, evidently to fit into the pocket. The price however, seem rather ' stiff " even for these times, but as a ' second thousand ' has been issued, the book evidently fills a want.

Studies in Insect Life, by **Dr. A. E. Shipley.** London: T. Fisher Unwin, 338 pp., 10s. 6d. net. Dr. Shipley's charming style is so well known that a book of his needs no recommendation from us. We merely chronicle its appearance. The ' Studies ' just issued contain eleven clever essays, not necessarily confined to insects. The subjects are ' Insects and War, the Honey-Bee, The Humble Bee, Moths and Bees, Ocean Depths, Sea Fisheries, Sir John Murray, Grouse Disease, Shakespearean Zoology, Science in the Seventh Century, Hate.' Though the subjects dealt with are varied, all are interesting and up-to-date. Some of the essays we had previously read elsewhere, but they are welcome in their present permanent form. Personally we don't like to see a specimen of *Homo sapiens* as a frontispiece to a book on insects, albeit that the portrait is a very nice one, and of the author.

The Biology of Dragonflies, by **R. J. Tillyard.** Cambridge University Press, 396 pp., 15/- net. The author tells us that during the past three years he has been able to undertake a considerable amount of work on the internal anatomy of Dragonflies, adding some new discoveries, and here and there rectifying errors. Most of the work is as yet unpublished, but a summary appears in the present volume, which is for the biologist rather than the systematist. More than ninety per cent. of the papers so far published, dealing with the Odonata, have been systematic in their aim. ' It is hoped that the method of treatment followed in this book, by which the morphological, phylogenetic and physiological viewpoints have been correlated, in so far as our present knowledge allows, will enable students of the Odonata to take up any line of research in this interesting order with a full knowledge of what has already been achieved.' Besides dealing with the various parts of the Dragon fly, the author refers to embryology, classification, distribution, the geological record, bionomics, and collecting and rearing. One chapter is devoted to British species. There is a Bibliography, a Glossary, map and plates.

On Growth and Form, by **D'Arcy Wentworth Thompson.** Cambridge University Press, pp. xvi. + 793, 21/- net. The author tells us that this volume of over 800 closely printed pages is ' all preface ' from beginning to end. He has ' written it as an easy introduction to the study of organic form, by methods which are the common-places of physical science, which are by no means novel in their application to natural history, but which nevertheless naturalists are little accustomed to employ.' He shows that a certain mathematical aspect of morphology, to which as yet the morphologist gives little heed, is interwoven with his problems, complementary to his descriptive task, and helpful, nay essential, to his proper

study and comprehension of form. While he has endeavoured to show the naturalist how a few mathematical concepts and dynamical principles may help and guide him, he indicates to the mathematician a field for his labour, a field which few have entered and no man has explored. His chapters deal with Magnitude, Rate of Growth, Forms of Cells, Absorption, Forms of Tissues, Concretions, Spicules, the Logarithmic Spiral, Spiral Shells of the Foraminifera, Shapes of Horns, Teeth and Tusks, Leaf arrangement, shapes of eggs, etc. There are over 400 illustrations.

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NEWS FROM THE MAGAZINES, etc.

Prof. Sharff gives a report on 'Advances in Irish Marine Zoology,' in *The Irish Naturalist* for July.

Mr. J. Small writes on 'The Origin and Development of the Compositæ' in *The New Phytologist* for July.

Mr. Cosmo Johns writes on 'Refractory Materials used in the Iron and Steel Industry' in *The Quarry* for July.

Dr. Winifred E. Brenchley has an interesting paper on 'Buried Weed Seeds' in *The Journal of the Board of Agriculture*, Vol. XXIV., No. 3.

The Animal World for July contains a paper on 'How Animals protect their Young,' by Donald Payler; and 'The Charm of Bats,' by L. Douglas.

The Scottish Naturalist for July-August is entirely occupied by a 'Report on Scottish Ornithology in 1916, including Migration,' by Leonora Jeffrey Rintoul and Evelyn V. Baxter.

The Hull Scientific and Field Naturalists' Club is apparently introducing a certain liveliness into its meetings. According to a press report, they have just had 'A Night with Bees.'

The Selborne Magazine for August contains Prof. R. A. Gregory's address to the Conference of Delegates of Corresponding Societies of the British Association, held in London in July.

The Museums Journal for August is almost entirely occupied by the various discussions which took place at the annual business meeting at London on July 10th. In parts it is quite amusing.

The Entomologist's Record for June contains 'Records of some New British Plant Galls. Ninety-nine New British Gall-mites (Eriophyidæ).' By Mr. Richard Bagnall and Dr. J. W. H. Harrison.

The Proceedings of the Liverpool Naturalists' Field Club for 1916, recently issued, contain a portrait and memoir of Lt.-Col. J. W. Ellis, a prominent member of the Society, who died last year. There are also short notes on the Club's excursions, etc.

Dr. J. W. H. Harrison describes 'New and Rare Homoptera in the Northern Counties,' and Mr. Richard South 'The Noctuidæ of Great Britain as arranged in the General Collection at the Natural History Museum,' in *The Entomologist* for August.

The Proceedings of the Geologists' Association, Vol. XXVIII., pt. 1, contain a paper on 'The Age of the Chief Intrusions of the Lake District,' by J. F. N. Green, also a report of an excursion to the Lower Carboniferous Rocks of Westmorland and North Lancashire.

A writer in *The Entomologist* draws attention to the following gem from *The Daily Telegraph*:—'The caterpillar plague in the Peak district has extended to Yorkshire and Westmorland, the pests evidently having travelled from the mountain tops in search of food.'

'What is Religion?'; 'To the Bereaved'; 'Germans and the Memorial'; 'Happiness and Music'; 'What are Dreams,' and 'Our Age of Unrest' are the titles of articles in 'The Meaning of Life,' edited by Mr. Robinson, who has edited a series of magazines dealing with 'popular' natural history.

In *The Entomologist's Monthly Magazine*, No. 638, Mr. M. Cameron points out that a specimen found in Cumberland by Mr. Day, and described by Mr. Joy as *Trogophlocus hemerinus*, is really *T. schneideri*. In the same journal Mr. J. Murray records *Ceuthorrhynchus alliariæ* Bris. in Cumberland.

Among the contents of *The Entomologist's Record* for July and August, we notice 'The Genus Hesperia,' by T. A. Chapman; 'The Coloration Problem,' by W. P. Curtis; 'Notes on the Coleophoridæ,' by H. J. Turner; '*Erebia zapateri*,' by T. A. Chapman, and 'The British Psychides,' by C. R. N. Burrows. There are several plates.

Among the contents of *The Entomologist's Magazine* for August, we notice 'Excessive abundance of the larvæ of *Charaeas graminis* in June, 1917,' by Mr. G. T. Porritt; 'Remarks on the Biology of *Charaeas graminis*, by Dr. A. D. Imms, and a note on two Dragon-flies (*Leucorrhinia dubia* and *Agrion pulchellum*) new to Cumberland, by Mr. F. H. Day.

Nature refers to the recent death of Dr. C. O. Trechmann, of Castle Eden, who was born at Hartlepool in 1851. Dr. Trechmann took a keen interest in mineralogy and crystallography, and had a fine collection of crystals, the best of which were bequeathed to the British Museum. A sulpharsenate of silver, trechmannite, which he discovered, was named after him.

Wild Life for July is again delightful. A. B. Wingman writes 'Concerning the Bittern'; F. D. Welch on 'Old Age Coloration in some Mammals'; C. W. Colthorp on 'Resting Attitudes of Moths, and some Notes on their Habits'; E. E. Pettitt 'Notes on the Common Gull in East Sutherland,' and Jasper Atkinson on 'The Greater Black-backed Gull.' There are also shorter notes, and the usual fine plates.

British Birds for July, besides containing many notes on birds, contains another sheaf of Sussex records. A Red Breasted Flycatcher was shot at Rye in October, 1916; a Dusky Warbler was shot in the same month at West St. Leonards, and is said to be the second British specimen; an Orphean Warbler was shot in September, 1916, at West St. Leonards, and is said to be the fifth recorded English specimen; an American Golden Plover was shot at Rye in the same month. All, of course, were 'examined in the flesh' at the time.

Among the contents of *The New Phytologist*, Vol. XVI., Nos. 5 and 6, we notice 'The Syrphid visitors to certain flowers,' by E. and H. Drabble; 'The Physiology of Parasitism,' by W. Brown, 'Recent work on Transpiration,' by R. C. Knight; 'The Discharge of Spores of *Leptosphæria acuta*,' by W. J. Hodgetts; 'The Distribution of Sexes in *Myrica gale*,' by A. J. Davey and C. M. Gibson; 'Radical Leaves of *Parnassia palustris* and *Valeriana dioica*,' by H. S. Thompson; and a Memoir on 'Ruth Holden (1890-1917),' by A. C. Seward.

British Birds for August, contains 'Field Notes on the Nesting of the Hobby,' by the late Capt. C. S. Meares; 'The Moults and Sequence of Plumages of the British Waders,' by Miss A. C. Jackson. There are also a number of shorter notes, among which are the usual belated Sussex records. A male Bonoparte's Sandpiper was shot at Rye, in April, 1916. It was duly 'examined in the flesh' at the time, and is now recorded. It is difficult to understand why all these rare Sussex specimens should almost invariably remain unrecorded over a year—unless—?

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3. SMALL ERMINE MOTH.—Eggs, Caterpillar, Cocoons, Ermine Moth, Nest in Apple Tree.
4. GOOSEBERRY SAWFLY.—Egg, Larva, Larva (last stage), Leaf, Sawfly, Branch, Cocoon.
5. ASPARAGUS BEETLE.—Eggs, Larva, Beetle, Pupa, Asparagus stripped of leaves, Cocoon.
6. BLACK CURRANT MITE.—Mite, Big Bud on Branch, Section of Bud with Mites.
7. RASPBERRY STEM BUD CATERPILLAR.—Caterpillar, Chrysalis, Moth (enlarged), Raspberry Cane.
8. MILLIPEDES and CENTIPEDES.—Three destructive Millipedes and two useful Centipedes.
9. SCALE.—Currant Scale, Scale on Aralia and Myrtle Leaves and Mussel Scale.
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We always have enemies within our garden-gates, and would-be gardeners are often reminded that the results of their labours may be brought to nought or greatly lessened by the work of destructive insects. There are other insects, however, that are our Allies, as they live on the destructive pests and thus help to protect the vegetables and fruit. It is, therefore, most necessary to be able to distinguish between useful and destructive insects, hence the popularity of Browns' "Enemies of the Garden," as the charts show at a glance how to tell our enemies from our friends. A set of the illustrations should be exhibited in every rural school or village club, as the knowledge which they and their accompanying handbook convey is essential to successful gardening. The small expenditure on same will prove a truly profitable investment.

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A MONTHLY ILLUSTRATED JOURNAL OF

NATURAL HISTORY FOR THE NORTH OF ENGLAND.

EDITED BY

T. SHEPPARD, M.Sc., F.G.S., F.R.G.S., F.S.A.Scot.,
THE MUSEUMS, HULL;

AND

T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
TECHNICAL COLLEGE, HUDDERSFIELD.

WITH THE ASSISTANCE AS REFEREES IN SPECIAL DEPARTMENTS OF

J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.E.S.,
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RILEY FORTUNE, F.Z.S.

Smithsonian Institution JUN 21 1921 National Museum

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YORKSHIRE NATURALISTS' UNION.

ANNUAL MEETING OF THE ENTOMOLOGICAL SECTION

President: W. P. WINTER, Esq., B.Sc.

Two meetings will be held in the Leeds Institute, Cookridge Street, on Saturday, October 27th, 1917. Afternoon meeting at 3-15 p.m., to consider and pass the Sectional reports for 1917 and to elect officers for 1918.

Tea will be provided at the Institute at 5 p.m. At 6 p.m. a further meeting will be held, at which several addresses on entomological topics will be contributed.

Exhibits of all orders of insects are invited, and it is important that exhibitors should attach their names to their exhibits and label specimens with names and data.

The various Secretaries earnestly solicit notes and records made during the season on entomological subjects in the county.

Members and Associates of the Union are cordially invited.

SECRETARIES.—(Lepidoptera), T. Ashton Lofthouse, F.E.S., Middlesbrough, and B. Morley, Skelmanthorpe; (Hymenoptera, Hemiptera and Diptera), J. F. Musham, F.E.S. Selby; (Neuroptera, Orthoptera and Trichoptera), Rosse Butterfield, F.E.S., Keighley (Coleoptera), W. J. Fordham, M.R.C.S., F.E.S., Bubwith.

B. MORLEY,
(Sectional Secretary),
Skelmanthorpe.

BOTANICAL SECTION.

THIS section will meet at the Leeds Institute, Cookridge Street, on Saturday, October 6th, at 3-30 p.m., in Room B.3.

Mr. E. C. Horrell will exhibit and speak about some Yorkshire Alien plants.

Dr. H. H. Corbett, M.R.C.S., will give a short account of some work the Doncaster Naturalists are doing at Martin Beck Wood.

Some further notes will be presented on the Moughton Scar peat (see *Naturalist* 1916, pp. 246, 383).

An Exhibit will be made of interesting Mosses from Leeds City (*Naturalist*, 1917, pp 119-124).

In view of the absence of excursions, members are particularly asked to bring or send reports of any botanical notes they may have made during this year, so that they may be included in the annual report.

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NOTES AND COMMENTS.

BRITISH ASSOCIATION'S REPORT.

The Report of the Newcastle meeting of the British Association was issued in July, and, notwithstanding the present conditions, it contains over 800 pages, most of which are printed in the interests of the advancement of science. In *The Naturalist* for October last, reference was made to the presidential addresses, etc.: these appear in the present report *in extenso*. In addition to the reports of the papers read at the sections, there are valuable Reports on the state of science, the Report of the Conference of Delegates, etc.

SHELLS AND EARLY CULTURE.

Mr. J. W. Jackson of the Manchester Museum has produced a book on 'Shells as evidence of the Migrations of Early Culture,'* and in case recent events may confuse the nature of the 'shells," which seem to be associated with Culture in these days, let us hasten to add that Mr. Jackson refers to Mollusca. The nature of the work is well shown in Professor G. Elliot Smith's Preface, where it is stated that 'Mr. Jackson undertook the task of collecting the ethnographical evidence relating to the cultural use of shells and of determining the specific identity of the latter. The first fruits of the preliminary survey rivalled the products of 'Father O'Flynn's' intellectual achievements :—

> 'Down from mythology into thayology,
> Troth! and conchology, if he'd the call."

A SCIENTIFIC STUDY.

'Mr. Jackson submitted a series of six reports upon his work to the Manchster Literary and Philosophical Society and these were published in its Proceedings.' These are reprinted, with certain additions, in the present volume, and we certainly congratulate the author on the way in which he has handled his subject. The story as told is very fascinating, and his theme shows that much valuable scientific research can be accomplished by a trained worker, and that there is much in the study of mollusca besides the compilation of lists. The book is illustrated and there are distribution maps.

YORKSHIRE PHILOSOPHICAL SOCIETY.

The Annual Report of the Yorkshire Philosophical Society, York, for 1916, is principally occupied by the eleventh instalment of a 'Catalogue of the British Plants in the Society's Herbarium,' by H. J. Wilkinson, the last number being 1574. Details of localities, collectors, etc., are given. There is also

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* Manchester University Press. 216 pp. 7/6 net.

an Index to the genera mentioned in the whole of the Catalogue. Mr. C. Wakefield gives a 'Description of the Coins of Æthelræd II. and Cnut,' in the Society's Collection, in the same report. There is a flattering reference to the recently published Bibliography of Yorkshire Geology, which is stated to be 'perhaps the greatest aid to the study of the natural features of the county since the publication of Prof. Phillips' great Classics on the "Geology of Yorkshire." There is no other county which can boast of such a work.'

A LINK WITH THE PAST.

The report also contains the following note:—'An interesting link with the past history of our Society was severed by the death of Miss Baines on the 22nd May, 1916. She was born in the Museum basement where her parents resided, and almost the whole of her long life of over 80 years was spent in the service of the Society. She well remembered Professor Phillips, the Rev. C. Wellbeloved and the Rev. J. Kendrick. Her father, Henry Baines, was Sub-Curator of the Museum from 1829 to 1878, and Miss Baines delighted to recount how in the early days of our Society a small menagerie was kept in the gardens, including a bear, a golden eagle, and several monkeys. The bear got loose and chased Professor Phillips and the Rev. Vernon Harcourt into an outhouse, and was afterwards sent by stage coach to the London Zoological Gardens in the charge of Henry Baines.'

THE MARINE BIOLOGICAL ASSOCIATION.

We have received *The Journal of the Marine Biological Association.** It includes the following papers:—'The Microplankton of Plymouth Sound from the Region beyond the Breakwater,' and 'The Peridiniales of Plymouth Sound from the Region beyond the Breakwater,' and 'Some Parasites of *Sagitta bipunctata*,' all by Marie V. Lebour; 'Post-Larval Teleosteans collected near Plymouth during the Summer of 1914,' by E. J. Allen; 'On the Amount of Phosphoric Acid in the Sea-water off Plymouth Sound,' by D. J. Matthews; 'The Development of *Alcyonium digitatum*, with some Notes on the early colony formation,' by Annie Matthews, as well as the Council's report, etc. The part is well edited, and there are several illustrations.

RUGBY SCHOOL NATURALISTS.

We have received the 50th Report of the Rugby School Natural History Society, which is a well-illustrated, well-printed, and well-edited publication of 128 pages. It includes the following

* New Series, Vol. XI., No. 2. Pages 133 to 272, 3/- net.

papers :—' The Fiftieth Birthday of N.H.S. : Notes on the Early History of N.H.S.' by Canon J. M. Wilson ; ' Reminiscences of Charles Darwin,' and ' The Habits of *Sesia bembeciformis*,' by W. C. Marshall ; ' Some Metallic Carbon Compounds,' by C. V. Patrick ; ' Surface Tension,' by M. Bateson ; ' Aluminium,' by J. D. R. Murray; ' The Migration of British Birds,' by R. P. Greg ; ' The Tawny Owl,' by C. C. Bevington, as well as summaries of proceedings, and twelve sectional reports. The illustrations include :—Francis Elliot Kitchener, Captain Frederick Courteney Selous, The Tawny Owl, Lesser Whitethroat's Nest, Lapwing's Nest, A Corner of the Horse Pond in Fawsley Park, Fawsley Church and Stokesay Castle. We congratulate this well-known society on its jubilee.

THE ANTLER MOTH PLAGUE.

The *Journal of the Board of Agriculture* for August contains two papers of a special interest, namely, ' Report on an Infestation of Larvæ of the Antler Moth (*Charæas graminis*, L.) in the Peak District,' by A. C. Cole and A. D. Imms, and ' An Invasion of the Caterpillars of the Antler Moth into Yorkshire,'' by John Snell. From the latter we learn that ' the damage done by the pest appears to have been confined entirely to the mountain pastures land, and in no instance does it appear to have reached the meadow lands or the mowing grass. Early in May, one or two farmers in the Airton district had noticed that some of their pasture still maintained a ' brown, winter appearance,' and that the sheep were being ' starved,' but it was only about the 1st June that they actually observed the presence of the caterpillars. The pastures which were first attacked were those near the tops of the Fell. On one farm alone on Scotsthrop Moor over 100 acres of mountain pasture were damaged to such an extent that practically no stock will be able to be carried for the rest of the summer. In this district there is practically no arable land, but the farmers were greatly alarmed lest the plague should spread to the better pastures and the meadow land in the valleys and on the lower slopes of the hills. The caterpillars were most abundant by the walls and along the small watercourses which intersect the pastures. At first, it was thought that this was due to the fact that in these situations there was probably a larger proportion of the harder and smoother grasses, but subsequent investigation indicated that the walls and the small streams acted as barriers to their progress. In the small stone folds thousands of caterpillars accumulated in the corner of a field.

CATERPILLARS MIGRATING.

' When the district was visited on the 15th June, which was a bright ,sunny day, a large proportion of the caterpillars appeared to be migrating rather than feeding. The extent to

which they were present was indicated by the large numbers which were trapped in holes and cavities due to drains having fallen in. In a single hole there must have been many thousands of larvæ. In the pools of one small stream there were larvæ lying in masses from 6 to 9 in. deep. These were decaying and the stench was very noticeable. In fact, all the small streams intersecting the invaded pastures were covered with a green slime due to the decay of large numbers of caterpillars which had been drowned. Mr. Cousins, who visited the Howes district, states that caterpillars found their way into the wool of the sheep when they were lying down, and that consequently the sheep became very restless. The owner of the sheep stated that it had been necessary to move them to other pastures, but it seems probable that the sheep were restless owing to the lack of grass.' We are indebted to the Board of Agriculture for permission to reproduce the illustration.

SCIENCE PROGRESS.

Science Progress for July contains a remarkably good summary of 'Recent Advances in Science,' under various headings, by specialists, and among the papers we notice one on the 'Eruption of Sakura-jima on January 12th, 1914,' by Dr. C. Davison; 'The History of Tools,' by Prof. Flinders Petrie, and the inevitable contribution by Mr. J. Reid Moir, this time dealing with the 'Most Ancient' Flint Implements. In his admirable and cleverly illustrated paper, Prof. Flinders Petrie points out 'the spread of forms throughout the ancient world illustrates the movements of trade and of warfare, while the isolation of various types at the same time shows how efficient and self-supporting the ancient civilisations were in most requirements. The history of tools has yet to be studied by a far more complete collection of material, above all of specimens dated back from scientific excavations. It will certainly be, in the future, an important aid in tracing the growth and decay of civilisations, the natural history of man.' Mr. Reid Moir calmly begins by informing us that 'if a typical example of these implements be examined, it will be recognised at once that the specimen owes its outline and form to a series of dexterous blows delivered by someone with a very definite idea of the kind of implement he wished to produce.' Most people would have guessed as much. We note that the author is now concerned solely with the form and flaking of the various specimens, and that, with the wisdom acquired by bitter experience, he considers that the 'somewhat complex geological problems involved' must be left to others for solution. We are getting a little hope for Mr. Reid Moir, inasmuch as he does not now claim infallibility, and no doubt as time goes on, he will deem it advisable to 'read more' and write less.

A NEW SPECIES OF *LIMA* FROM THE ENGLISH CHALK.

T. SHEPPARD, M.Sc., F.G.S.

Some time ago the Museum at Hull acquired the collection of Chalk fossils made by Mr. E. B. Lotherington, from his chalk-pit at Middleton-on-the-Wolds. This pit is situated at a height of 220 feet above sea-level at a point about equidistant from Beverley and Driffield, and a little to the west of those places. The quarry is 100 feet deep.

The collection referred to consists of nearly a thousand specimens, remarkable on account of their excellent state of preservation and by the fact that they differ in general appearance from the fossils usually found in the Chalk of Yorkshire. There are, moreover, several species not recorded from the Chalk of any other part of the North of England. The Sponges, too, are unusual in appearance, inasmuch as in many cases they consist entirely of oxide of iron, but, notwithstanding, the most minute details of their structure are still preserved.

The quarry is also well known as yielding the fine series of *Inoceramus involutus* Sowerby, notable in this locality on account of its abundance and unusually large size. The largest specimen we have has a height of 114 mm. in its upper or right valve, and a length of 216 mm., while the lower valve is still larger on account of its inflation; it is 300 mm. across, and 554 mm. along the outside edge. Some of these *Inocerami*, as in the case of many of the Sponges, are preserved in a light-coloured, brittle flint, which in places resembles very hard white chalk in texture.

In connexion with this quarry, one may mention also the large number and variety of well-preserved specimens found there, having regard to its limited area; though this may be to some extent due to the assiduity with which the specimens have been collected.

Among the specimens in our collection from the Middleton pit are Sponges (various species, including *Stachyspongia spica** Roemer sp.), *Inoceramus involutus* Sowerby, *I. cuvieri* Sowerby, *Spondylus latus* Sowerby, *Lima hoperi* Mantell, *Terebratula carnea* Sowerby, *T. semiglobosa* Sowerby, *Terebratulina striata* Davidson, *Actinocamax verus* Miller, *Micraster cor-anguinum* Leske, *M. praecursor* Rowe, *Echinocorys scutatus* Leske, *Cidaris sceptrifera* Mantell, *C. hirudo* Sorignet, *Epiaster gibbus*, *Parasmilia centralis* Mantell, *Poro-*

* Of this species, Dr. A. W. Rowe informed Mr. Lotherington that he had not previously seen it above the Chalk Marl, hundreds of feet lower than the Middleton example.

1917 Oct. 1.

sphæra globularis Phillips, *Ptychodus mammillaris* Agassiz, *Oxyrhina mantelli* Agassiz, and fish Vertebræ.*

In the collection is a *Lima* remarkable alike for its unusual shape and for its excellent state of preservation. It was found in association with fossils typical of the base of the *cor-anguinum* zone at a depth of about 70 feet from the ground-level.

Fortunately, Mr. Henry Woods has published a monograph on the Cretaceous Lamellibranchia, and his researches in connexion with the Limidæ† have considerably facilitated the work of ascertaining that the present species had not been previously described.

Notwithstanding the extraordinary variations in form and ornamentation in the species of Chalk Limidæ figured and described in this Monograph, the shape of the present specimen is even more unusual than in any chalk *Lima* hitherto known. The nearest related species is apparently *Lima* (*Plagiostoma*) *hoperi* Mant., shown in figures 8a and 8b on Plate IV., of the Monograph, from the zone of *Actinocamax quadratus* at East Harnham, the specimen being in Dr. Blackmore's collection.

The specimens of *L. hoperi* figured are not from the same horizon as the Middleton quarry; although we have a specimen (a single valve) of *L. hoperi* from Middleton, but it is much higher in comparison with its length than those figured by Mr. Woods.

Lima (Plagiostoma) middletonensis n.sp.

The new species, to which we propose to give the name of *Lima* (*Plagiostoma*) *middletonensis*, consists of two valves preserved in contact near the umbones with the anterior dorsal margins separated, and the ventral margins wide apart. The left valve is quite perfect and the right valve has part of the shell missing on the dorsal slope and towards the anterior end. The following description therefore is based on an examination of the left valve.

Description:—Shell oval-oblong, nearly twice as long as high, convex, rounded; unusually inequilateral. Anterior-dorsal margin very long, almost straight; posterior-dorsal margin very short; the remainder forming a fairly regular long-oval curve. Umbones pointed, close together. Apical angle 125°. Ears small, with growth lines; posterior longer than high; the left anterior ear broken, and the right not well shown, but evidently smaller than the posterior ears. Anterior area well developed and slightly concave, distinctly

* In case any would-be collector is desirous of visiting the Middleton Quarry, it may be as well to state that the owner's permission is necessary before a visit can be made.

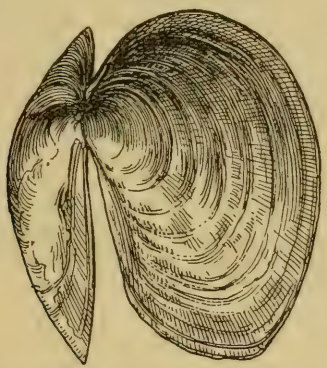
† A Monograph of the Cretaceous Lamellibranchia of England. Mon. Pal. Soc., Vol. II., Part 1, 1904, pp. 1-56.

limited, strongly marked with eighteen radiating grooves. The grooves are uniformly distinct throughout.

Surface of shell with pronounced lines of growth forming fairly distinct peripheral grooves. Throughout the surface fine linear striæ with pits occur, though these are more pronounced on the margins of the valves. The striæ are slightly wavy, occasionally discontinuous, and are deeper near the posterior margin. The pits average four to the millimetre.

Measurements :—Length, 50mm., height, 33 mm.

Affinities :—This species appears to be very markedly distinct in shape from any other of the Cretaceous Limidæ, and seems most nearly to resemble *Lima hoperi*, which has



Lima (*Plagiostoma*) *middletonensis* **n.sp.**

a wide range in the south of England, and is found in the same quarry as that from which the new species was obtained. *L. middletonensis* is distinguished at once from *L. hoperi* by its extreme anterior development and by its much more oval contour.

Type :—In the Hull Municipal Museum.

Distribution :—Base of the *Micraster cor-anguinum* zone, Middleton-on-the-Wolds, East Riding of Yorkshire.

——: o :——

***Thecosmilia* sp. in the Millepore Oolite of South Cave.**—Some weathered slabs of Millepore Oolite recently obtained from the cutting west of South Cave railway station were covered by a large coral. Mr. Lang, of the British Museum, has kindly examined these and refers the species to *Thecosmilia*, though specific determination was difficult on account of the condition of the specimens. In any case, this seems to be an addition to the fauna of the Yorkshire Millepore bed.—T. Sheppard.

THE GEOGRAPHICAL DISTRIBUTION OF THE MOTHS OF THE SUBFAMILY BISTONINAE.

J. W. HESLOP HARRISON, D.Sc.

XII.—THE GENUS PHIGALIA (DUPONCHEL).

Phigalia pedaria (Fab.). Distribution :—Central Europe, the British Isles, Southern Scandinavia, Northern Italy, Russia, the Uralsk, Siberia and the Ussuri District.

Phigalia sinuosaria (Leech). Japan.

Phigalia titea (Cramer). Atlantic America as far north as Canada and as far south as Texas.

Phigalia (?) *verecundaria* (Leech). The Japanese area.

Phigalia, with all due respect to its apterous females, bears no close relationship to any of the genera of like peculiarities, the wanderings of which we have already followed. Those genera are of immediate evolution from the *Megabiston Lycia* line whilst the present, by the presence of the prominently spined harpe on the male genital valves, is thrown very closely indeed to the members of the closed section of the Amphidasyds on the one hand, and to the true *Boarmiinæ* on the other. To certain species in the latter group, as illustrated by *Arichanna melanaria* and *A. hamiltoni*, it comes near enough in the male genitalia as to indicate an alliance of immediate phylogenetic value.

Without encroaching further on the subject matter of my essay on the phylogeny of the *Bistoninæ*, enough has been said to demonstrate that *Phigalia* arose at some point where the Amphidasyd Bistonines and the specialised *Boarmiinæ* rubbed shoulders with one another. Such contact occurs at many stations, but most of these may be dismissed from our calculations as representing stations reached by migrating forms spreading from the same centre under the action of the same compelling forces, and therefore hurried along the same path.

But both groups in question attain their maximum development in Eastern Asia, as does also the genus *Phigalia*. The natural inference, therefore, is that in *Phigalia* we have a genus of Eastern origin ; and, allowing for its preference for temperate climates, its original home was Northern Asia.

Where do we find its habitats of to-day ? We find them precisely in the positions upon which *Amphidasys betularia* and its various forms have a firm hold but with this difference, that the latter species, in its Palæotypical form, *A. cognataria*, without betraying the slightest divergence from type, exists in all the recognised abodes of Tertiary relict forms. The present genus, whilst undeniably existing in the same habitats, displays a noteworthy difference inasmuch as in each station it appears in the guise of a distinct species. Nor must it be

supposed that such species are what we have termed or have come to regard as "representative species; the departure from type is too great for that.

In our studies in the genus *Amphidasys* we concluded that it arose in time when the climatic conditions to the north and to the south, to the east and to the west, were so uniform as to cause animals and plants throughout that vast area to be specifically the same. From this we gather that *Phigalia* spread seemingly when these conditions were breaking down, and when climatic variations were able to work their will in the moulding of new species from plastic genera—and this conclusion demands in its turn that *Phigalia* colonised new ground in later times by far than *Amphidasys*, and times when inroads of the sea and various other contributory factors were adversely affecting the geographical and climatic conditions of the more northern regions. Such a period, nevertheless, must have been one when free access existed for insects feeding on oak and trees of a similar type to America from North-western Eurasia.

In other words the period must have been when the sub-polar temperate belt rejoiced in a sylva comprising not such trees as *Magnolia, Sassafras, Liriodendron*, but consisting of members of the genera *Quercus, Ulmus, Fraxinus*, etc., whence we decide that our genus was moving in early or middle Pliocene times—a period indicated independently by the demonstrably later evolution of *Phigalia* as compared with *Amphidasys*.

Here we must direct our attention to the individual species of the genus which is so homogeneous that, at first sight, one can scarcely grasp, making due allowance for geographical and climatic agencies, differences tangible enough to aid us in fixing upon any one species as the earliest form. However, dissection of the male genitalia reveals that the vesica in *Phigalia titea* bears an enormous finger-like cornutus, not undeveloped in the others, for its positions can be discerned, but lost. The possession of this cornutus brings us once more toward the *Boarmiinæ*, and also very near the next genus *Microbiston*, a genus barely younger that *Phigalia* but actually so, as its excised genital valves and its enormous abdominal development of spines demonstrate. Since *Phigalia* has yielded *Microbiston*, whilst *Phigalia* both in Eurasia and America once possessed this exaggerated spine, it follows that *Phigalia titea* more nearly approaches the original form. Furthermore, this same conclusion would have been gained had we made a minute examination of such minor features as the greater or less elaboration of wing pattern, and the nearness of such patterns to those of the primitive *Boarmia* and Amphidasyd wing.

Thus once again, confirmatory evidence is gained that *Phigalia* is a genus originating in Asia for, necessarily, we have to fix its home somewhere in Siberia to allow for its contact with its immediate relatives *Microbiston* and *Chondrosoma*. Somewhere then in the old basins of the Obi and Yenesei, *Phigalia* took its rise, and thence worked its way east and west in northern latitudes, very early in its wanderings throwing off *Microbiston* or what, in those far off days, represented it.

Almost equally early a form not far removed from *Phigalia pedaria* came into being and lagged behind ; but the prototype pressed on in its westward march reaching the American area before the inevitable southward flight of animals and plants began. When that event did occur, following the same route as *Amphidasys cognataria* and crowds of other insects in like plight, it took sanctuary in that refuge for trees and arboreal forms, the Atlantic and Gulf States of America.

But the reign of the Ice King was not to last for ever ; century after century elapsed, but, in the end, genial conditions did for *P. titea* what they did for its companions. As in byegone ages, its northern home was in part reopened. Slowly the forests of deciduous trees readvanced and with them went the insect, regaining lost ground as far north as Canada just as did *A. cognataria* and *L. ursaria*. Unlike these, it has managed to retain some hold on its home of refuge for it yet inhabits Texas. No doubt this possibility is caused by its appearance early in the year and by its rapid feeding up, coupled with its powers of æstivating as a pupa.

Its history thus, in all essentials, is parallel with that of other early forms we have already discussed.

Next we must return to the form which we shall now know as *P. pedaria*. To the west and to the east it passed ; not, we must be careful to note, over Transcaspia and to the north and south of the Caspian Sea. Had the insect occurred so far south no passage was open in that direction ; the Aralo-Caspian Sea still maintained its maximum area. On the contrary, its westward course (and its eastward one too) was to the north of the Eurasia of to-day. Therefore, when, in Northern Europe of late Pliocene times, subsidences occurred, followed by the fall in temperature indicating that the Glacial Period was at hand, *P. pedaria* fell back to the south, delaying its retreat by assuming a birch diet. Its final withdrawal had to come, and it accompanied the great host of later fugitives into Southern Europe until the Glacial night-mare was past. With the vanishing of the ice, it very early made a move, relying on its powers of adapting itself to new foods, and managed to reach and colonise the whole of Britain ere our islands were disjoined from the mother continent.

But *P. pedaria* for its continuity had not to rely solely on

the European contingent. Quite the larger portion of its Pliocene habitats were north Asiatic, and these it enjoyed long after the European detachment had been driven back. Even in Siberia, however, the land in time became ice-bound, and it was only in maritime districts and sheltered nooks in non-glaciated mountains that survival was possible. There it persisted but, ere encroachment on lands where once the ice held sway was feasible, Japan was severed from the mainland and insular, as opposed to conditions almost continental, played their part. As a result of such determining factors added to geographical isolation, specific divergence occurred, and the Japanese race became *P. sinulosaria*. Not far away mutation was working too, and the slimmer *P.* (?) *verecundaria* appeared.

Subject to no such novel conditions, but still influenced by its environment to some extent, the continental division diverged so very slightly that its divergence was of varietal value only, and has resulted in the Siberian local race *extinctaria*.

When a more temperate climate was once again the possession of Siberia, a gradual westward movement ensued, resulting in the occupation of all the other stations of the present day.

XIII.—THE GENUS CONIODES (HULST).

Coniodes plumigeraria (Hulst). Distribution :—British Columbia, California and Colorado.

We often hear it propounded as a paradox that, whilst the Flora and Fauna of Atlantic North America seem to contain the same general elements as that of Pacific Asia and Japan, on the contrary the affinities of the Flora and Fauna of Pacific America are more or less with those of Europe.

For practical purposes, the former statement may be regarded as strictly in accord with the facts, because both areas in question include within their limits the remains of a Fauna and Flora which was once universal in the Northern Hemisphere as was pointed out in discussing the genus *Amphidasys*. Differences of detail, involving the presence of 'representative' species, occur, but these in themselves are insufficient to alter the facies of the life of the two regions.

The latter portion of the paradox is only relatively true. As was mentioned in studying the Mid-Tertiary genus *Amphidasys*, compared with Eastern North America, the area west of the Rockies is, geologically speaking, young. Naturally, therefore, the old Tertiary plants and animals, except those which could cross the plains or had fled down the mountains themselves were not able, except at isolated points, to reach

the Californian, British Columbian and intervening regions; such beings, then possess but few representatives in the west.

This, no doubt, is possible but that the dwellers there to-day, save these very few relict forms such as the Wellingtonias (*Sequoiæ*), form a complex of very recent aggregation indeed. In this, complex careful disentanglement reveals a structure composed of five elements:—

(1) The not inconsiderable endemic group certainly, in the first place, evolved from intruders from the south.
(2) Forms palpably of southern origin.
(3) Forms just as decidedly from the north-west and therefore from Asia.
(4) The very few eastern forms that have crossed the mountains.
(5) The Tertiary relict forms probably of diverse origin.

Of these five divisions only the third concerns us here.

After Pacific America emerged from the sea, and prior to the Glacial Period, a gradual infiltration of Asiatic forms took place *via* the land now overwhelmed by the Behring Straits; nor did the occurrence of the Glacial epoch in Europe interrupt this entirely, for the advent of the Ice Age was long postponed in Asia as well as in Western America. Clearly, all such migrating species would be of temperate proclivities.

Concerning the fate of these intruders but little doubt can be felt but that the local glaciation experienced in the Californian area was not sufficient to exterminate them. Moreover, there never has been a protracted (relatively) period without its uplift rendering the passage of these types possible, although it was interrupted at the climax of the Ice Age.

Even if this survival cannot be conceded, one must admit that, throughout the Northern Hemisphere, the Glacial Period was succeeded by a climate so genial that the average annual temperature was far higher than that of our era.

Preceding this and persisting through it, a slight uplift of the sea bottom brought about the reunion of America and Eastern Asia. Aided by the conjunction of a milder climate in northern latitudes with the reopened causeway, a flood of forms of all groups, ranging from buttercups to larches, and from butterflies to the Rocky Mountain Sheep (*Ovis montana*) migrated from Asia to America. Unless such forms were Arctic or montane, they found in the Rockies an insurmountable barrier, and were forced to restrict their habitats to the tract between California and Alaska. As any such invasion, granting the maximum possible increment in average annual temperature, was only permissible for forms of temperate tendencies all such immigrant species are bound to be characteristic of temperate climates. If not contemporaneously then not far behind or before, Europe was re-opened for

settlers but, from its geographical limitations, its small extension in a north and south direction, all it could receive was a quota of temperate forms from Asia and a small proportion of other forms (which, since they have now deserted us, need not be considered) reinforcing its Glacial survivors. The bulk, if not all, of species seeking to become naturalised Europeans could only come from Eastern Asia, and thus from the very area whence the new temperate element in Pacific America advanced.

Wherefore, in a broad way, the dwellers in the two regions must coincide, although plainly they may, as indeed they do, differ in detail.

Amongst such components of common origin, in the Lepidoptera are to be found, *Callophrys rubi*, replaced in far western America by *C. dumetorum*, *Parnassius delius* by *P. smintheus*, *Papilio machaon* by *P. zolicaon*, *Saturnia pavonia* by *S. mendocino* and, lastly, the objects of our investigations, *Coniodes plumigeraria*, representing the development, already foreshadowed in *P.* (?) *verecundaria*, of the genus *Phigalia*. Our insect yields us then in Pacific America a metamorphosis of *Phigalia*, which, pressing on from Asia, crossed the Behring area and, kept within bounds by the Rockies, skirted the coast finally to organise all suitable ground from Alaska to Southern California.

However, the Post-pleistocene promise of warmer days was not kept. Gradually, the annual isotherms favourable for the continuance of the insect in its northernmost abodes, slipped to the south ; with them passed the insect until it was pressed within its limits of to-day in British Columbia, California and Colorado—there to be an ever-present terror to the twentieth century walnut grower. To the genus *Juglans* it has transferred its attentions from *Quercus*, *Ulmus*, *Salix* and the like.

Thus we see how it happens that *Phigalia* occurs in a typical form in the Appalachian subregion but is replaced, on the other side of America, by the allied genus *Coniodes*.

XIV.—THE GENUS APOCHEIMA (HUBNER).

Apocheima hispidaria (S.V.). Distribution :—Central Europe, North and Central Italy, Northern Balkans, East-central Siberia.

Apocheima cineraria (Ersch.). Eastern Turkestan, Bokhara and Samarkand.

In *Apocheima* is to be recognised a branch from the main stem of which *Microbiston* is the modern representative. Indeed, allowing for the dwarfing of the latter genus, an almost inevitable result of its desert abodes, there is but little

to separate them ; what little there is lies in the loss in *Apocheima*, of the huge vesical cornutus peculiar to *Microbiston* and the primitive *Phigaliæ*, together with that unerring mark of progress in the Bistonines, the disappearance of the posterior middle spurs. So close are the two genera that the only opinion one can form is that *Apocheima* was evolved from *Microbiston*. This latter genus occupies a somewhat limited tract in West Central Asia, and seems never to have departed far from it. In consequence, in that very area *Apocheima* took its rise. But *Microbiston* originated from *Phigalia*. Therefore, in view of the apparent lack of enterprise displayed by *Microbiston* in colonising new ground, *Phigalia* too, must have, in its early days, gone forth from localities much the same. In both cases this allocation fits in exactly with the facts, for the tract in question is precisely half way between the disconnected habitats of *Apocheima hispidaria*, and likewise lies midway between the extreme outliers of *Phigalia* and its more modern derivatives.

Phigalia, however, we have regarded as of Middle Pliocene origin ; *Apocheima* must necessarily be assigned to later days. Developing in the same lands, with the same preferences for an oak diet, and under conditions not dissimilar, both journeyed forth along the same paths. Making the most of its start, *Phigalia* wandered further afield, its outposts reaching Japan in the east and America in the west. *Apocheima*, on the other hand, seems to have stopped short in Europe.

Obviously, this lack of coincidence in the areas occupied, primarily caused by the later development of *Apocheima*, was actually brought about by interruptions in the land-bridges, or rather by unfavourable climatic conditions on them when *Apocheima* was speeding on.

Be that as it may, *Apocheima hispidaria*, the less highly specialised of the *Apocheima* forms, striking to the north-west, soon after its rise (direct western movement being as we know impossible), proceeded America-wards in some land of high northern latitudes where now rolls an Iceberg-strewn sea. Ere its goal was attained, that event, so often pictured before, swept the oak-belt southward and with it the insect. Not being of a very adaptable nature as regards food, no lasting substitute was adopted and the earliest stages of the Glacial Epoch saw it in full possession of the non-coniferous forests of Central Europe. Here its stay was but temporary. The piling up of the ice fields in the north was followed by the sweeping of the Alpine ice to the lowlands and the oak forests were obliterated, the trees surviving to perpetuate their race being hurried south in two divisions, one retreating through France and on to Spain and the other to the Balkan Peninsula.

Clearly the retreat due south would afford more facilities

in the way of refuge for creatures of warmer preferences, whilst that to the south-east would carry with it beings more tolerant of colder climates. Thus the insects withdrawing to these refuges, would be, unavoidably, of different tendencies.

But how does that affect our investigations? In any consideration of the British range of insects depending on oak* for their pabulum, a remarkable set of facts asserts itself. Unless such insects have alternative foods, except in extremely few cases, they stop short in Yorkshire or to the south thereof; but rarely indeed do they reach Ireland. Furthermore, they are found quite commonly in the oak forests of Spain. Link these facts with the further observation that forms peculiarly Central European, like *Drymonia querna*, attached to oak, are absent from Britain, and we must accept it as certain that the bulk of our British oak feeders regained this country from the south of France and from Spain. Since such forms are limited in range in Great Britain and Ireland, and ordinary Central European insects are widespread, if not universal, in our islands, advance due north for them must have been a much more serious undertaking than that to the west so successfully made by the general feeders. Despite this, the northward passage for oaks and their tenants has been easier than for oaks of eastern origin striking westward. And this was to be expected, for the matter depends upon soil. Most of the commoner plants issuing from the Balkans would find the recently glaciated lands not unsuitable, but it was not so with the oaks; their march was invariably behind. On the contrary, in the other case, when once the Pyrennees were negotiated a free course to the north over unglaciated areas lay open to oaks and their satellites. Still, such a northern advance, depending as it did on the progressive amelioration of the climate, was necessarily slow and tedious, and that is the reason why species of this type so rarely penetrated far into Britain. Ere they could do so, Ireland was cut off and soon also England was separated from the Continent and, the impulse behind being lacking, a halt was called.

This, therefore, has been the history of the British stock of *hispidaria*; it has been a refugee in the Spanish Peninsula, and has emerged thence with the vanishing of the ice in North and Central Europe.

Similarly, the other part seeking shelter in the Balkan haven, issued forth and accompanied the oaks. This, as we pointed out, was precisely the procedure of *Poecilopsis pomonaria*. In consequence, the ground held by this contingent

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* In Epping Forest the larvæ of *A. hispidaria* feed largely on hawthorn as well as on oak; and it has, of course, long been known that they would eat hawthorn in confinement.—G.T.P.

of *Apocheima hispidaria* coincides with the habitats of *P. pomonaria*. This, and the subsequent fusion of the two bands, completes the history of *Apocheima* in Europe.

Northern Europe was not, however, the sole terrain colonised by Pliocene *A. hispidaria*. It had occupied the whole of the oak districts of Northern Asia and, when glacial conditions at length made their presence felt there, retreat was a necessity for safety and the insect fell back. The fate of the European stock was repeated and the Siberian host was split in two, one section passing south-west into drier and therefore non-glaciated areas of Eastern Turkestan, and the other into sheltered nooks in the river valleys of Eastern Siberia. In the latter region, the insect encountered a climate not unlike what it had been accustomed to and little, if any, divergence occurred physiologically or otherwise. In Siberia, the disappearance of Glacial conditions has not been so marked as in Europe and thus the old forest belts are monopolised by league after league of coniferous trees; as a result, only a little ground has been re-colonised by Siberian *A. hispidaria*.

To conclude, let us return to that other portion which wintered in Eastern Turkestan. Climatically, the conditions were vastly different from what it had enjoyed before and, moreover, they kept deteriorating. In place of the rainfalls of temperate lands, it had to endure scorching dry summers and chilly winters. Size reduction took place and, as a defence from the heat, the body vestiture altered; there was a toughening of the abdominal chitin to lessen the chance of desiccation and, simultaneously, the body armature increased. Thus the species *Apocheima cineraria* was evolved and spread into regions of like environment.

From this it will be seen that, in *Apocheima*, we have a case of the origin of species through geographical isolation and other climatic conditions.

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BIRDS.

Birds in Wharfedale.—I was at Gillbeck, Barden, Wharfedale, in June last when a Hawfinch alighted in an oak tree at a short distance from where I was standing. I was told that the Woodcock had again nested in Wharfedale. The Chiffchaff which bred last year within a few miles from here has probably nested again this year. At least, I am informed by Mr. Longbottom of Bingley that a pair has been about the same place during the whole of the breeding season. The Chiffchaff breeds very sparingly in North-west Yorkshire.—E. P. Butterfield.

THE MOSSES & HEPATICS OF DENBIGHSHIRE.

D. A. JONES.

(*Continued from page 292*).

Trichostomum crispulum Bruch, 1, 7; Wrexham, Berwig. Var. *elatum* Schp., 7. Var. **nigro-vivide* Braithw., 7 (near it); Minera, World's End. The form of this variety that grows on the limestone rocks and blocks in the last two localities differ in size from the original gathering from Ingleboro', Yorkshire. The stems that make up the small, neat tufts, are short, and the leaves very small, concave and sub-tubular. This is the third record for the British Isles. Var. **brevifolium* B. and S.; another very rare variety which was found in compact tufts on damp shelves in a limestone quarry at Berwig.

T. mutabile Bruch, 1, 3, 7; Berwig, Nant y Ffrith. Var. *littorale* Dixon, 1, 2, 3; Minera, Nant y Ffrith, World's End. Var. **cophocarpum* Schp.; Minera, World's End.

**T. flavovirens* Bruch, 1.

**T. nitidum* Schp., 1.

T. tortuosum Dixon, 1, 3; Wrexham, Minera, World's End.

Cinclidotus fontinaloides P. Beauv., 2, 3, 4, 7; Llangollen, c.fr. Gresford, Nant y Belan.

**Encalypta rhabdocarpa* Schwaeg.; World's End (Ingham and Jones), Berwig. First detected by Mr. Ingham in the former locality. With the exception of Carnavonshire and Yorkshire, the records for this moss in the British Isles have hitherto been confined to Scotland.

E. streptocarpa Hedw., 1, 5, 7; Wrexham, Berwig, etc.

Zygodon Mougeotii B. and S., 1, 5; Minera.

Z. viridissimus R. Brown, 1, 7. Var. **rupestris* Hartm., 1, 7.

Ulota Bruchii Hornsch., 1; Nant y Ffrith.

U. crispa Brid.; Nant y Ffrith. Var. **intermedia* Braithw., 1.

Orthotrichum anomalum var. *saxatile* Milde, 1, 3; Berwig, Nant y Ffrith, World's End.

**O. cupulatum* Hoffm., 1, 3; Minera. Var. **nudum* Braithw., 7; Nant y Ffrith, Minera.

O. leiocarpum B. and S., 1.

O. Lyellii Hook and Tayl., 1, 4.

O. affine Schrad., 1, 4.

O. rivulare Turn.; Nant y Belan, Llangollen. Roots of trees on the banks of the River Dee at both places.

**O. stramineum* Hornsch., 1, 4.

O. tenellum Bruch, 7.

O. diaphanum Schrad., 1, 7.

**Splachnum ampullaceum* L., 1.

**Ephemerum serratum* Hampe; Glasgoed.

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**Physcomitrella patens* B. and S. ; Gresford.
**Physcomitrium pyriforme* Brid. ; Gresford.
Funaria fascicularis Schp. ; Brynteg.
**F. Templetoni* Sm., 1.
**F. calcarea* Wahl., 1 ; Minera.
F. hygrometrica Sibth., 1 ; generally distributed in the Wrexham district.
Aulacomnium palustre Schwaeg., 1, 8 ; Minera, Cyrn y brain.
A. androgynum Schwaeg. ; Brynteg.
**Bartramia ithyphylla* Brid., 2, 5.
B. pomiformis Hedw., 1, 4, 5, 8, 9 ; Minera, World's End, Cyrn y brain. Var. **crispa* B. and S. ; Minera.
Philonotis fontana Brid., 1, 8 ; Berwig, Minera, Nant y Ffrith.
P. calcarea Schp., 3, 7 ; Eglwyseg Rocks.
Breutelia arcuata Schp., 1, 5, 7, 8 ; Nant y Ffrith.
**Leptobryum pyriforme* Wils. ; Nant y Ffrith.
Webera nutans Hedw., 1, 2, 5, 7 ; Bwlchgwyn, Minera, Cyrn y Brain. Var. **longiseta* B. and S., 7.
**W. annotina* Schwaeg ; Nant y Ffrith. Var. **proligera* Bryhn, 8 ; Nant y Ffrith, Minera, Bwlchgwyn.
W. carnea Schp., 1, 2, 5, 6, 7, 8 ; Glasgoed, Nant y Ffrith.
W. albicans Schp., 1, 3, 5, 8 ; Nant y Ffrith, World's End, Minera.
Bryum inclinatum Bland., 1, 2, 4, 5, 7 ; Minera.
B. pallens Sw., 3, 4, 7 ; Berwig, Minera, Nant y Ffrith.
B. pseudo-triquetrum Schwaeg., 3, 4, 7, 8 ; Wrexham, Nant y Ffrith, Bwlchgwyn, Cyrn y brain.
**B. intermedium* Brid. ; Berwig.
B. capillare L. ; general. Var. **elegans* Braithw., 2 ; Minera, World's End (Duncan and Jones). In very small tufts on limestone rocks.
**B. obconicum* Hornsch., 1, 6.
B. atropurpureum Web. and Mohr, 3, 4, 6 ; Wrexham, Minera. Var. **gracilentum* Tayl., 4 ; Minera.
B. murale Wils., 1, 6 ; Wrexham, Berwig.
B. alpinum Huds., 1 ; Minera. Var. **viride* Husn., 1.
B. argenteum L. ; generally distributed. Var. **lanatum* B. and S. ; Minera, Wrexham.
Mnium cuspidatum Hedw., 7.
M. rostratum Schrad., 1.
M. undulatum L., 1, 2, 5, 7 ; Wrexham, Minera, World's End.
M. hornum L. ; abundant.
**M. serratum* Schrad., 7 ; Minera.
**M. stellare* Reich. ; Gresford, Berwig.
M. punctatum L. ; frequent.
Fontinalis antipyretica L. ; Gresford, Wrexham.
F. squamosa L. ; at Llangollen, in River Dee.

Neckera crispa Hedw., 1, 3, 7; Berwig, Nant y Ffrith, Minera. Var. **falcata* Boul., 1, 3, 7; World's End.
N. complanata Hübn., 1, 3, 7; Gresford, Minera.
Leucodon sciuroides Schwaeg., 3, 4, 7; Eglwyseg Rocks, Llandegla, on trees (Wilson, Duncan and Jones).
Pterygophyllum lucens Brid.; Minera.
Porotrichum alopecurum Mitt., 1, 2, 7; River Dee at Llangollen, Nant y Ffrith.
**Leskea polycarpa* Ehrh.; Gresford.
Anomodon viticulosus Hook. and Tayl., 7; Eglwyseg Rocks, Wrexham.
Heterocladium heteropterum B. and S.; Minera.
Thuidium tamariscinum B. and S.; not uncommon.
**T. delicatulum* Mitt., 1, 7; probably the moss found in the part of the district marked 7 is *T. Philiberti*.
**T. Philiberti* Limpr.; Berwig, Minera.
Climacium dendroides Web. and Mohr, 1; Minera.
**Cylindrothecium concinnum* Schp.; Minera (Knight and Jones).
**Orthothecium intricatum* B. and S; Minera.
Camptothecium sericeum Kindb.; frequent and generally distributed throughout the district.
C. lutescens B. and S., 1, 7; Wrexham, Berwig.
Brachythecium albicans B. and S., 1, 3.
B. rutabulum B. and S.; frequent. Var. **plumosulum* Bry. Eur., 5.
B. rivulare B. and S., 5; Nant y Ffrith, Minera.
B. velutinum B. and S., 1, 2, 4; Nant y Ffrith.
B. populeum B. and S., 1, 5; Wrexham, Cyrn y Brain.
B. plumosum B. and S., 1, 2; Glasgoed, Nant y Ffrith, Minera.
B. purum Dixon, 1, 5, 7; not uncommon in the remaining parts of the district.
Eurhynchium crassinervium B. and S., 2, 3, 7; Minera.
E. prælongum Hobk., 1, 2; Nant y Ffrith, Minera, Cyrn y Brain. Var. **Stokesii* Brid., 1, 8.
E. Swartzii Hobk., 1, 2, 4, 7; Gresford.
**E. pumilum* Schp., 1, 2.
**E. Teesdalei* Schp.; Gresford, Nant y Ffrith, World's End. The fertile plant grows freely on boulders and rocks in the stream that flows from World's End.
E. tenellum Milde, 1; Gresford, Nant y Ffrith.
E. myosuroides Schp., 1; Minera, on rocks. This common moss is found in great abundance on trees in the counties of Merioneth and Carnarvon. Its extreme rarity in this part of Denbighshire is no doubt due to the injurious effects of smoke. Var. **rivulare* Holt, 2, 4.
E. myurum Dixon, 1, 4, 5; Minera.
E. striatum B. and S., 1, 3, 5, 8; Wrexham.

Eurhynchium rusciforme Milde ; generally distributed.
E. murale Milde ; Berwig, Minera.
E. confertum Milde, 1, 2, 4 ; Wrexham, Cyrn y brain, Ruabon, Nant y Belan, Minera, World's End.
**Plagiothecium depressum* Dixon ; Glasgoed.
P. elegans Sull., 1 ; Minera.
P. denticulatum B. and S., 1, 5, 8 ; Nant y Ffrith, Wrexham, Minera.
P. silvaticum B. and S., 1, 4 ; Minera, Nant y Ffrith.
P. undulatum B. and S., 1 ; Minera.
Amblystegium serpens B. and S., 1, 2, 4, 8 ; Wrexham, rather common.
**A. Juratzkanum* Schp. ; Gresford.
**A. Kochii* B. and S., 3 ; a rare plant for Wales, previously only recorded from Merionethshire. It has since been found in Pembrokeshire.
A. fluviatile B. and S., 4.
A. filicinum De Not., 1, 3, 4, 7 ; Wrexham, Nant y Belan, Minera, World's End, Nant y Ffrith. Var. **trichodes* Brid. ; Nant y Ffrith (Duncan and Jones)—first detected by J. B. Duncan.
**Hypnum polygamum* Schp., 1.
**H. stellatum* Schreb. ; Wrexham, Berwig. Var. **protensum* Röhl, 1, 7.
**H. chrysophyllum* Brid., 1 ; Wrexham, Minera.
H. uncinatum Hedw., 3, 7 ; Nant y Ffrith, Minera.
**H. revolvens* Swartz ; Minera.
H. commutatum Hedw., 3, 7 ; Eglwyseg Rocks, Gresford, Minera.
**H. falcatum* Brid., 2, 7 ; Eglwyseg Rocks.
H. cupressiforme L. ; generally distributed. Var. *resupinatum* Schp., 1, 2, 3 ; Minera. Var. *filiforme* Brid., 1, 2. Var. *cricetorum* B. and S., 4, 7 ; Bwlchgwyn, Cyrn y brain. Var. *tectorum* Brid., 1, 4, 5 ; Wrexham, Ruabon, Minera, World's End. *Var. *elatum* B. and S., 3.
**H. Patientiæ* Lindb., 1, 4, 8.
H. molluscum Hedw., 1, 3 ; Wrexham, Minera, World's End, Nant y Belan.
H. palustre Huds., 2, 3, 7, 8 ; Gresford, Glasgoed, Brymbo.
**H. scorpioides* L., 3, 7.
**H. stramineum* Dicks., 1.
**H. cordifolium* Hedw. ; Nant y Ffrith (Duncan, Watson and Jones).
H. cuspidatum L. ; common. Var. **pungens* Schp. ; World's End (Ingham and Jones).
H. Schreberi Willd. ; frequent.
Hylocomium splendens B. and S. ; not uncommon.
H. loreum B. and S. ; Minera.

Hypnum squarrosum B. and S. ; abundant.
H. triquetrum B. and S. ; frequent.

HEPATICS.

**Riccia crystallina* L. ; Gresford.
**Ricciocarpus natans* (L.) Corda ; pond near Rossett, legit Dr. Thomas, of Chester. New to Wales. Specimens of this interesting hepatic were exhibited at a meeting of the Liverpool Botanical Society in July, 1917, by the finder. The President, Mr. W. G. Travis, kindly sent me a few fronds for examination.
**Reboulia hemisphærica* (L.) Raddi. ; Minera, Nant y Ffrith.
**Conocephalum conicum* (L.) Dum. ; Gresford, Glasgoed, Minera.
**Lunularia cruciata* (L.) Dum. ; Glasgoed, Gresford, Brynteg.
**Preissia quadrata* Scop. ; World's End.
**Marchantia polymorpha* L. ; c.fr., Nant y Ffrith (Watson, Duncan and Jones).
Aneura pinguis (L.) Dum. ; Berwig, Minera, Nant y Ffrith, World's End, Eglwyseg Rocks.
**A. multifida* (L.) Dum. ; Eglwyseg Rocks.
A. major (Lindb.) K. Müll. ; Nant y Frith.
Metzgeria furcata (L.) Lindb. ; Nant y Ffrith, World's End, Minera.
**M. pubescens* (Schrank) Raddi ; Nant y Ffrith, Minera (Duncan, Watson and Jones), World's End.
**Moerckia Flotowiana* (Nees) Schiffn. This rare and interesting hepatic is not uncommon on the sandhills of North Wales. It grows on calcareous soil at Berwig and Minera. In August 1907, I gathered it at Burbage, in Derbyshire, in a similar habitat to the latter.
Pellia epiphylla (L.) Corda ; well distributed in the district.
**P. Fabbroniana* Raddi ; Minera, Nant y Ffrith, Eglwyseg, World's End, Gresford. Var. **lorea* Nees ; Nant y Ffrith, World's End—in extensive sheets in the latter locality.
**Blasia pusilla* L. ; Minera, Nant y Ffrith.
Marsupella emarginata (Ehrh.) Dum., 10 ; Minera.
Alicularia scalaris (Schrad.) Corda, 10 ; Minera, Berwig, Nant y Ffrith, Eglwyseg Rocks.
**Eucalyx hyalinus* (Lyell) Breidl., 10.
Haplozia crenulata (Sm.) Dum., 10 ; Minera. Var. **gracillima* (Sm.) Heeg ; Minera.
H. cordifolia (Hook.) Dum., 10.
H. riparia (Tayl.) Dum., 10 ; Nant y Ffrith, World's End. Var. **rivularis* Bern. ; World's End (Ingham and Jones).
Gymnocolea inflata (Huds.) Dum. ; common on Minera Mountain.

**Lophozia turbinata* (Raddi) Steph. ; Glasgoed, Gresford.

L. ventricosa (Dicks.) Dum., 10 ; Minera, World's End, Nant y Ffrith.

L. bicrenata (Schmid.) Dum., 10 ; Minera, embankment near Moss and Pentre Railway Station.

**L. excisa* (Dicks.) Dum ; embankment near Moss and Pentre Railway Station.

**L. incisa* (Schrad.) Dum., 10.

**L. quinquedentata* (Huds.) Cogn. ; Minera.

L. Floerkii (Web. and Mohr) Schiffn. ; Nant y Ffrith, moorland, Minera. Var.* *Naumanniana* Rees ; moorland, Minera (Duncan and Watson). This variety grows in great quantities under the heather. Gemmæ in yellowish clusters were found in the type on the leaf-lobes at the apex of the stem. Unfortunately, they were too young to be figured and described. Hitherto they have never been seen to occur on this plant. According to a note in Macvicar's Handbook to British Hepatics, the descriptions of gemmæ had to be transferred to the allied species, *L. Hatcheri.*

**L. attenuata* (Mart.) Dum. ; banks of Sychnant River, Minera.

Plagiochila asplenioides (L.) Dum. ; Nant y Ffrith, Gresford, Minera, Eglwyseg Rocks, World's End. Var. **minor* Lindenb. ; Minera, Nant y Ffrith. Var. **humilis* Lindenb. Nant y Ffrith. Var. *major* Nees, 10 ; Nant y Ffrith, Minera.

Lophocolea bidentata (L.) Dum., 10 ; Glasgoed, Minera, Eglwyseg Rocks.

**L. heterophylla* (Schrad.) Dum. ; Glasgoed, Nant y Ffrith, Gresford.

Chiloscyphus polyanthus (L.) Corda ; Llangollen, Nant y Ffrith, Minera, Gresford.

**C. pallescens* (Schrad.) Nees ; Nant y Ffrith.

Cephalozia bicuspidata (L.) Dum. ; generally distributed.

**C. media* Lindb. ; Nant y Ffrith.

Cepholoziella byssacea (Roth.) Warnst., 10 ; Minera, Nant y Ffrith. Var. **asperifolia* (Jens.) Macv. ; banks of Sychnant River, Minera. A very rare and distinct variety with large conical papillæ on the leaves.

**C. bifida* (Schreb.) Schiffn. ; banks of Sychnant River, Minera.

**C. stellulifera* (Tayl., MS.) Schiffn. ; caves, Nant y Ffrith—the only other Welsh record is from Pembrokeshire (V.C. 45).

**C. myriantha* (Lindb.) Schiffn., 10. This rare hepatic was gathered by Prof. Barker on a moorland between Llangollen and Glynceiriog. It is the first record for the Principality. Since then, the writer has found it among heather on the Flintshire side of Nant y Ffrith.

**Cepholoziella Limprichtii* Warnst. ; Nant y Ffrith (J. C. Wilson). It occurs in five other vice-comital areas—four in England and one in Scotland. Barren and non-typical plants have a remarkable resemblance to *C. æraria* and were at first doubtfully recorded as belonging to that species. Fertile plants were found by Mr. Wilson and the paroicous inflorescence excludes the rarer species.

Calypogeia trichomanis (L.) Corda ; Nant y Ffrith, Minera, World's End.

**C. fissa* (L.) Raddi ; Brymbo, Glasgoed, Nant y Ffrith.

**C. arguta* Nees and Mont. ; Nant y Ffrith.

Lepidozia reptans (L.) Dum. ; Nant y Ffrith, Minera.

**L. setacea* (Web.) Mitt ; Nant y Ffrith.

Ptilidium ciliare (L.) Hampe, 10 ; World's End.

Diplophyllum albicans (L.) Dum. ; common.

Scapania compacta (Roth.) Dum. ; Minera.

S. aspera Bernet ; Abergele (Pearson), Coedpoeth, Berwig, World's End.

**S. nemorosa* (L.) Dum. ; Minera, Nant y Ffrith.

**S. dentata* Dum. ; Nant y Ffrith, Minera.

S. undulata (L.) Dum. ; Minera, Nant y Ffrith.

S. irrigua (Nees) Dum. ; Minera.

**Madotheca thuja* (Dicks.) Dum. ; Eglwyseg Rocks.

M. platyphylla (L.) Dum., 10 ; Nant y Ffrith, Minera, Eglwyseg Rocks.

**M. rivularis* Nees ; a rare species growing on boulders in the stream that flows through Nant y Ffrith.

**Cololejeunea calcarea* (Lib.) Schiffn. ; in fair quantity on the rocks at World's End.

Frullania tamarisci (L.) Dum, and *F. dilatata* (L.) Dum., 10 ; Nant y Ffrith.

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The *Forty-sixth Annual Report of the Chester Society of Natural Science, Literature and Art* is 'considerably condensed in order to economise paper as desired by the paper commissioners appointed by the Board of Trade.' The report deplores the death of Thomas Shepheard, who was one of the original founders of the Society, and of Prof. McKenny Hughes, who was President for 16 years. There is a lengthy list of members who have 'given their services to their King and Country for the period of the war,' though, unfortunately, some of them have apparently done so for a much longer period.

We quote the following from the *Yorkshire Post* of August 28th, without comment :—'The death occurred suddenly at his residence, Eyebury, Peterborough, on Saturday, of Major A. N. Leeds, a well-known geologist and agriculturalist, at the age of 70. Major Leeds, who was an old Volunteer officer of the Northamptonshire Regiment, was a great authority and practical manipulator of the Saurian remains in the Oxford clays of the Peterborough district. A mammoth discovered some years ago in the Fletton Brickyards, near Peterborough, was set up by him, and is now in the South Kensington Museum. It was named in his honour *Plesiosaurus Leedsi*.

HEDGE BEADSTRAW AMONG STONE WALLS.

F. A. LEES.

On the mountain limestone of Craven and the Oolites of North Yorkshire, this aggregate (perhaps not quite fixed) species, at elevations where the typical road-hedge *Mollugo* is running out, and *Galium montanum* (*austriacum*) beginning to appear, the close observer of variation constantly finds growths (in not-normal sites) which strike him as ' different,' either in leaf contour, or stature, with quite indeterminate characters of inflorescence as regards size of seed or pedicellar dichotomy. Such an example Mr. Pickard found recently on the Stockdale road above Settle, at circa 800 feet. Naturally, one tries to find such a noticeable growth with a name, formal or varietal, but, alas ! careful examination and reference to Dr. F. N. Williams' *Prodromus Floræ Britannicæ* (Pt. 5, p. 216, 1909) emphasises what I have just said—he has been through the mill—that at the zonal limit lines where a plant is just 'running out,' at the end of its endurance, all sorts of vegetative variations, telling of inexpressible stresses of local ' climate ' will be in evidence (not perhaps beyond a season or two). Mr. Pickard's gathering cannot be called typical *elatum* Thuill, and in oval-obovate membranous leaflet-of-whorl, it only resembles that ' *umbrosum* ' (shade growing ?) *form*—not even '*var* ' of Williams, to which he refers *G. insubricum* of Gaudin, and Syme.

In the note on stational distribution, Dr. Williams notes that, normally an ubiquit on the Permian marl-lime tract, it grows up to 270 metres in Westmorland, and adds, further, that it will hybridise with *Galium verum* (often growing on the same lynch of wayside bank or undercliff, and that a Symean variety ' *Bakeri* ' judging from Yorkshire specimens has ' no characters' by which to separate it from *elatum* Thuill. ! Here in west-York Craven, we have an exactly similar abnormal growth facially varying, as two brothers or sisters may, and yet without any clear invariable habit or value of line that can be put into definite words. It is all very interesting to the enthusiastic herbarium maker, young or old ; but I think the lesson is not hidden from us too deeply to be unearthed. Nature ' recks not ' (of course) of the systematists' feeble forcible efforts to express her, because ' She ' or ' It," as you like, is merely our term for a Law of cell-life invariable in its greater, and even lesser lines of scaffolding ; but elastic for all that, *the ' finished article,'* be it leaf contour or vestment showing the final, and as it seems, proximal effect of repression or restriction on the part of something externe (quite invisible if atmospheric, tho' not so inobvious in a water plant immersed in its medium). But, an we wish, a pretty clear correlation

of these varigrowths to soil matrix and elevation above sea-level, plus aspect, N.S.E. and W. but never allwards, can be arrived at. This perhaps is all we can do, beyond recording our impressions which, too, may develop and vary with that 'experience' which alone 'teaches' as the Latin tag had it. In my own Flora of West Yorkshire, I recorded it up to 750 feet, and gave several Rib-Craven stations. In the as-yet unpublished *Supplement*, I assign this ascending Excelsiorian to the Early Modern or Patrial Class, which, 'doing its bit' to compensate for the eons of disintegrational elimination of earlier forms of herb life, is slowly but surely gaining a higher foot of earth where circumstances allow of it. In 1888 it had reached Addingham in Wharfedale, it has now got much higher by the river nearly to Coniston Cold.

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GEOLOGY.

Mammoth Teeth on the Yorkshire Coast.—Though the opportunities for examining the Holderness Cliff sections at the present time are not ideal, coast erosion still goes on, and has revealed a number of teeth of the mammoth (*Elephas primigenius*). We have recently obtained examples from Spurn Point, Withernsea and Hornsea.—T. SHEPPARD.

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ENTOMOLOGY.

Wilsden Lepidoptera.—A few days ago one of our schoolmaster's sons described a butterfly which he had recently seen in this neighbourhood, which could be no other than a Camberwell Beauty (*Vanessa antiopa*). It must, I think, be thirty years since I last saw this species in the Wilsden district. On Friday last, a friend of mine informed me that he saw at rest on a wall near Thornton, in August, a Convolvulus Hawk Moth (*Sphinx convolvuli*); and whilst talking with a friend in the main street here, at the end of July, I saw a Humming-bird Hawk Moth (*Macroglossa stellatarum*) feeding on the red valerian, and another specimen of this species flew into a house in this town and was shown to me. Another insect which I have not seen for years was brought to me by a contractor's son, namely *Sesia bembeciformis*, which he had taken from the bole of a willow. I have only seen one specimen of *Scoparia conspicualis* this year. *Scoparia pyralalis*, which is a very local insect in this district, I saw very plentifully on the pipe tract near Bingley. *Coccyx vacciniana*, which I have always considered scarce up to this year, I found in some plenty near Bingley. I took one *Mixodia schulziana* on Baildon Moor last June or July; only one record is previously given for this district, for 1897.—E. P. BUTTERFIELD, Bank House, Wilsden, 12th Sept., 1917.

NOTES ON THE SLUGS AND LAND SHELLS OF ICELAND.

HANS SCHLESCH.
Hellerup, Denmark.

(Continued from page 300),

GENUS CEPAEA (Held.)

Cepaea hortensis Müller.

S. Nuphlid (E.O. and J.H.), Bjarnanes in Hornafjördur, 1913 (H.S.), Höfdabrekka in Myrdalssandur (J.St.), Drangshlid in Rangarvallasyssel near Eyjafjœllajökul, July, 1896 (B.S.).

E. Seydisfjördur, 1912 (F.H.S.).

var. *roseolabiata* Taylor.

S. Bjarnanes in Hornafjördur, 1913 (H.S.)

var. *ludoviciana* d'Aumont.

According to Prof. Sandberger, the specimens recorded by O. A. L. Mörch belong to this thin-shelled form.

REMARKS : *Cepœa hortensis* Müller is very rare and appears only to exist in the Southern parts from Reykjanes to Seydisfjördur. Eggert Olafsson called it *Nerita testa globosa planiuscula apertura parva, tribus anfractibus,* and says, ' this is a well-known and acknowledged prominanté species, found on Nuphlid, a short distance from Krisuvik, on the South Coast (of Reykjanes peninsula) ; it may be justly compared to a small cherry and tolerably as large over all hitherto known Icelandic Land-snails. It is dark yellow, with five stripes over the under side ; it lives mostly amongst the dry places, between heather and Blayberry-roots.' The occurrence of *Cepaea hortensis* Müller is interesting. In the Tertiary times a hypothetic land-bridge connected N.W. Europe with Iceland, Greenland and America. Mr. John W. Taylor says,* ' *Cepaea hortensis* has probably arisen within the north-westerly part of the Germanic region and has diffused itself chiefly to the north-west, spreading to the Faroe Islands, Iceland, and even to North America. The presence of *H. hortensis* is somewhat perplexing, and has led to much speculation and diversity of opinion as to its claim to be regarded as a true native of that country, or whether it owes its presence there to the voluntary or involuntary agency of man, as it is a species which has extended its range very far beyond that of its immediate European allies, from which it is now completely isolated

* Monograph of British Land and Freshwater Mollusca, III., p. 361-62.

geographically. In its organisations it is also quite different from and immensely superior to the *Protogona*, the general helicidian type characteristic of Eastern North America, which, according to Dr. Pilsbry, has a very simple and primitive structure; yet the distributional area of *H. hortensis*, extending as it does along more than a thousand miles of coast, and its occupancy of numerous rocky islets uninhabitable by man, combined with the discovery of its presence in the Pleistocene clays of Maine, lend support to the view that it has reached that country through natural diffusion, by means of the land-bridge, believed by many to have connected North-western Europe with North America during Tertiary periods, and by means of which a few other terrestrial species of boreal distribution have probably also reached eastern North America.'

Genus Pupa (Draparnaud).

Sub-genus *Pupilla* L. Pfeiffer.

Pupa muscorum L., var. *lundströmi* Westerlund.

Recorded by Westerlund in Syn. Mollusc. extram. Scand., 1897, p. 61.

Sub-genus *Vertigo* Müller.

Pupa arctica Wallenberg.

W. Isafjördur (F.H.S. and H.S.).

Heidalur, Armula and Kaldalón, all in the Isafjardardjúp, 1913 (H.S.). Saudlauksdalur (E.O.).

Remarks: Probably distributed over the whole of Iceland, and found under stones, in decomposing vegetation, near running water, etc. Eggert Olafsson says, '*Cylindrus, testa tota spirali ad extremitates obtusa, spiris* 6 *ore angustissimo* is a shell about the size of a cabbage seed. The two circular grooves at the opening are the colour of flesh, the others blue-grey; they live principally in the fields, among grass and moss, on and near the rocks (near Saudslauksdalur in Patricksfjördur).'

Genus Cochlicopa (Risso).

Cochlicopa lubrica Müller.

W. Saudlauksdalur (E.O.), Höfda in Dyrafjördur, 1913 (H.S.), Isafjördur, 1914 (H.S.).

S. Nuphlid (J.St.), Kirkjubær (Sidan), near Skaptá (J.St.).

N. Akureyri, 1912 (F.H.S.).

Remarks: Exists over the whole island, partly in damp places and partly in dry places, under leaves, moss, stones, in grass, and in the crevices of rocks, etc. Eggert Olafsson writes about this species, '*Buccinum testa ovataacuta, spiria* 6, *membranacea fulva splendente* is a most beautiful snail, especially through its glittering red-yellow shell, in which it surpasses all the other species, but it is very small' and inconspicuous.'

GENUS SUCCINEA (Draparnaud).

Sub-genus *Neritostoma* Klein.

Succinea groenlandica Beck.

W. Reykjavik, June, 1841 (J.H.); Laugarnar by Reykjavik (J.St.); Pókufoss in Kjósarsyssel, August 28th, 1896 (B.S.); Isafjördur, 1913 (H.S.); Armula near the Drangajökul, 1913 (H.S.).

N. Akureyri (A.C.J. and F.H.S.).

S. Höfdabrekka in Myrdalssandur (J.St.).

REMARKS: In general, common everywhere, in shadowy and damp places, under stones, etc. *'Dolium ovato-planiusculum, spira duobus anfractibus obtusa, testa fusca'* (Eggert Olafsson).

Sub-genus *Amphibina* (Hartmann).

Succinea altaica v. Mart, var. *norvegica* Westerlund.

Recorded from Iceland by Westerlund in Syn. Moll. extram. Scandinav., 1897, p. 88.

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NOTES ON *MARGARITANA MARGARITIFERA* (LINNÉ).

HANS SCHLESCH,
Hellerup, Denmark.

1758 *Mya margaritifera* Linné, System. Naturae, ed. X., p. 671
1761 ,, ,, ,, Faun. Sveciae, p. 516.
1774 ,, ,, Müller, Vermium terr. et fluviat., II., p. 210.
1779 ,, ,, Schröter, Die Geschichte der Feussconch., p. 168, tab. 4, fig. 1.
1788 *Unio margaritiferus* Retzius, Novae Testaceorum genera p. 16.
1793 ,, ,, Sprengler, Skrivter af Naturhist. Selsk. 3, p. 53.
1817 *Margaritana fluviatilis* Schumacher, Essai d'un Nouveau Systéme des Habit. des Vers Testacés p. 124, tab. 10, fig. 4.
1822 *Unio margaritiferus* Nilsson, Historia Moll. Sveciae, p. 103-06.
1831 ,, *margaritifera* Draparnaud, Hist. Nat. d. Moll. terr. et fluv. de France, p. 132.
1856 ,, *margaritifer* Nordenskjold and Nylander, Finlands Mollusker, p. 86-87.
1868 *Margaritana margaritifera* Colbeau, Moll. viv. de la Belgique, p. 26.
1871/73 ,, ,, Westerlund, Fauna Moll. terr. et fluv. Sveciae, Norvegiae et Daniae, p. 577-79.

1882	*Margaritana margaritifera*		Esmark, Land and Freshwater Mollusca in the Arctic Regions of Norway, p. 103.
1884	,,	,,	Clessin, Deutsche Excursions Mollusker-Fauna II., Aufl., p. 529-32.
1887	,,	,,	Clessin, Die Moll. - Fauna, Oesterreich, Ungarns u. d. Schweiz, p. 722.
1896	,,	,,	L. E. Adams, The Collector's Manual of Brit. Land and Freshwater Shells, 2 edit., p. 149-50.
1900	,,	,,	Goldfuss, Die Binnenmollusken Mittel-Deutschlands, p. 263-65.
1917	,,	,,	Schlesch, Notes on Planorbis and Margaritana in Iceland (*The Naturalist*, p. 201).

Concha ovali-oblonga, compressa, crassa, margine superiore curvato, inferiore recto vel sinuato ; dentibus cardinalibus crassis, conicis, lateralibus nullis.

L. 120-135, alt. 50-65, cr. 35-40 mm.

This interesting mussel was named '*Musculus niger, omnium longe crassimus; conchæ longæ ; species Gesn. Aldrov.*' by Martin Lister. *Margaritana margaritifera* is one of the few species that have a wide distribution. According to Lionel Adams the 'pearl mussel' is found in rivers in mountainous districts in several parts of Great Britain from Shetland to Cornwall, but only to the west of a line drawn from Scarborough to Exeter, and also in Ireland and the Isle of Man. On the Continent it is distributed from Aragon, in Northern Spain, the Pyrenees, France, the Vosges, the Ardennes, Belgium, Netherlands, in a few places, Germany*, Bohemia, Russia (Dniester, Don and Volga to the White Sea), Denmark (in Vardeaa, Jutland), the Scandinavian peninsula from Scania to the Arctic Ocean.† In Finland it is common and distributed in the numerous lakes and streams. It has been recorded for Iceland, a single specimen being found in 1863, near Reykjavik. Further, *Margaritana margaritifera* lives in Siberia, Altai Mountains, Manchuria and the eastern and western river systems of North America.

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* Bavaria, Böhmerwald, Fichtelgebirge, Saxony, several brooks in Silesia, Hanover, Thuringia, in the Sauer in Nassau, Westerwaldes and Hundsrückens.

† Miss Birgithe Esmark records *M. margaritifera* from Senjen Island and Borge in Lofoten Islands ; also in Berlevaag in East Finmarken and in South Varanger.

Characteristic of this species is, that it lives in swiftly running brooks on the hills, the waters of which are rather poor in lime. When, by any accident, the epidermis is destroyed, the anterior margin and umbones are often dissolved by the water and the animal is gradually destroyed, and finally there only remains the chitin of which the epidermis consists.

When extraneous bodies enter into the mussel between the shell and mantle, the latter is irritated, and the animal secretes ' mother of pearl ' around the irritant bodies, and in this way the pearls are formed. According to Lionel E. Adams, Suetonius says that Cæsar was partly attracted to Britain by the reports of pearls found there, and Pliny states that he covered a buckler with them, which he dedicated to Venus Genetrix. Tacitus mentions a theory current in his time that the dull reddish colour of our pearls was due to their being collected from cast-up shells instead of being gathered from living shells from the bottom of the sea ; but he adds, with characteristic dry humour, that the fault probably lay in the pearls themselves, as otherwise his avaricious countrymen would have been sure to discover the best methods of obtaining them.

Schröter tells in his work * how the Chinese produce genuine pearls. He says that they introduce into every mussel a diminutive ball made of mother of pearl, after which operation the mussel is deposited in the river beds. After some years, the mussel is again fished up, when every ball is found to be coated with a new layer of mother of pearl.

Big ball-shaped clear pearls are the most valuable, and the price is fixed according to size. Pearl fishing was formerly carried on in many parts of Europe, but it does not pay as, according to Clessin, one hundred mussels must be examined in order to obtain a single pearl, and only one of eighteen pearls can be used ; a few times, however, big finds have been made, for instance in Donegal and in the Conway.

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Mr. H. A. Allen sends us a ' Catalogue of Types and Figured Specimens of British Cretaceous Gasteropoda preserved in the Museum of Practical Geology, London, reprinted from *Summary of Progress of the Geological Survey for* 1915.

In the *Memoirs and Proceedings of the Manchester Literary and Philosophical Society* (Vol. LXI., pt. 1) Mr. H. Bolton has a paper on ' The " Mark Stirrup " Collection of Fossil Insects from the Coal Measures of Commentary (Allier), Central France.'

Mr. Charles Bailey favours us with a copy of his interesting paper ' On the Contents of a Herbarium of British and Foreign Plants for presentation to the Victoria University of Manchester, reprinted from Vol. LXI., part 2, of *Memoirs and Proceedings of the Manchester Literary and Philosophical Society*, Session 1916-7.

* Die Geschichte der Feussconchylien, Halle, 1779, p. 178.

NEWS FROM THE MAGAZINES.

The Museums Journal for July contains a paper on 'Preparation of Plants for Exhibition,' by C. E. Jones.

The Entomologist's Record for September contains some 'Further Notes on the Earwig,' by Dr. Chapman.

In *The Irish Naturalist* for September, Mr. R. Lloyd Praeger has an illustrated paper on '*Equisetum litorale* in Ireland.

In *The Entomologist's Monthly Magazine* for September, Mr. E. E. Green gives 'Observations on British Coccidæ; with description of new species.'

In *The Journal of Conchology* for August, Mr. A. E. Boycott has a note entitled 'Where is the Male of *Paludestrina jenkinsi*?' and Mr. J. T. Marshall gives 'Additions to British Conchology.'

In *The Lancashire and Cheshire Naturalist* for July Mr. R. S. Bagnall has some notes on 'Lancashire Myriapoda New to Britain.' He also writes on 'The Symphyla of Lancashire and Cheshire.'

Mr. F. Pitt gives 'Some Notes and Observations on the Mole in Captivity,' and Mr. L. H. Huie has 'Some Notes on the Microscopical Preparation of Insects,' in *The Scottish Naturalist* for September.

The Entomologist for September contains 'Contributions to our Knowledge of the British Braconidæ, No. 3,—Microgasteridæ.' by G. T. Lyle; and 'British Odonata in 1916,' by W. J. Lucas. The latter includes many northern records.

In *The Selborne Magazine* for September, the Rev. E. A. Woodruffe-Peacock, writing on 'The Means of Plant Dispersal,' states:—'People will "pull your leg" if they can—a "scientific leg" is irresistible and fair game. "They are so dully knowing, these naturalists."'

We learn from *Nature* that 'The first part of a Bibliography of Fishes,' the work of Dr. Bashford Dean and Dr. C. R. Eastman, has just been published by the American Museum of Natural History. It consists of the first instalment (A to K) of a list of titles of papers, arranged under author's names, and is a large octavo volume of 718 pages.

Wild Life for August includes the following well illustrated papers:—'On the Present Status of the Wryneck; Abnormal Colouration in Mammals,' by Dr. F. D. Welch; 'The Currant, or Magpie, Moth,' by C. W. Colthrup; 'Resting Attitudes of Moths, and some Notes on their Habits,' by C. W. Colthrup; 'Notes on the Yellow Wagtail,' by E. Eykyn; 'Sexual Selection in Birds,' by Edmund Selous.

The Geological Magazine for September, contains the following papers—'Notes on the Pycnodont Fishes,' by A. Smith Woodward; 'Morphology of the Echinoidea and their Allies,' by H. L. Hawkins; 'Evidence of Charnian Movement in East Kent,' by H. E. Baker; 'Albite-Granophyre, etc., of Carrock Fell,' by A. Holmes; 'The Fossils of the East Anglian Boxstones,' by Alfred Bell; 'Mammalian bones from the London District,' by A. Smith Woodward.

We obtain the following from *The Entomologist's Record* for September: 'Aught of the potato seems to attract the attention of many just now. A correspondent's box was put in our hands the other day, on the lid of which was pasted the following paragraph:—"The Potato Bug.—Here (observes a Canadian contemporary) is a good thing on the Colorado 'tater-bug.' Three men comparing notes—one says: "There are two bugs to every stalk." A second says: "They have cut down my early crops and are sitting on the fence, waiting for my late crop to come up," and "Pshaw!" says the third, "you know nothing about it. I passed a seed store the other day, and saw the bugs looking over the books to see who had purchased seed potatoes."

NORTHERN NEWS.

Dr. P. G. H. Boswell has been appointed to occupy the Herdman Chair of Geology at Liverpool.

The Board of Agriculture and Fisheries has issued two leaflets dealing with the storage of potatoes, and breaking up grass-land.

The Herbarium at Kew has acquired the Mycological collection of the late J. W. Ellis, which consists of nearly 1,600 specimens.

The 68th Report of the Ipswich Museum, etc., gives particulars of the work accomplished during the year, and there is an illustration of a specially designed case for postage stamps.

The Food Production Department of the Board of Agriculture and Fisheries has issued a 'Report on the Breaking-up of Grass Land in England and Wales in the Harvest Year, 1916-7.' This includes reports on the work accomplished in the Northern counties.

Prof. W. G. Fearnsides has been awarded the Greenwell Silver Medal of the North of England Mining and Mechanical Engineers for his paper on 'Some Effects of Earth Movements on the Coal-Measures of the Sheffield District (South Yorkshire), and the neighbouring parts of West Yorkshire, Derbyshire and Nottinghamshire.'

Heard at the Zoo (in front of the Ostrich's cage) :—
1st YOUTHFUL NATURALIST : "'Sneagle."
2nd Do. : "'Snotaneagle, 'Snork."
1st Do. : "'Snotanork, 'Snowl."
2nd. Do. : "'Sneither, 'Snostrich."—*London Opinion.*

Punch gives 'From a cigarette-card :—Reed Warbler, *Acrocephalus streperus.* This bird is found in nearly every part of the British Islands. It builds a nest about a foot off the ground in the reed beds, and is formed of grass, horse hair and sometimes feathers.' Of course, if *Punch* will go to 'gasper-cards' for his natural history we can't help it. Besides, no doubt, the warbler figured was a stuffed specimen, which would account for the grass and horsehair.

The *56th Quarterly Record of Additions* (Hull Museums Publication : No. 111) has just been issued (34 pages, with illustrations, 1d.). Among the contents we notice :—'Spout of Roman Terra Cotta jug'; Early Burial Customs'; 'Concerning Pins'; 'A Whaling Token'; 'Old Wine Bottles, 'War Relics'; 'An interesting Find on the Humberside'; 'Jutland Battle Medals'; 'A Sedan Chair'; 'Mr. C. S. Middlemiss's Collection'; 'Rare Yorkshire Tokens,' and 'Interesting Slavery Relics.'

Volume LI. of the *Transactions of the North Staffordshire Field Club* includes the following items :—'Presidential Address : Progress in Geology,' by J. T. Stobbs ; 'Erratics in Coal Seams,' by J. H. Lister and J. T. Stobbs ; 'The Course of the River Sow,' by A. Huntbach ; 'Local Distribution of Glacial Boulders,' by P. W. Taylor ; 'Scandinavian Place Names in North Staffordshire,' by H. V. Thompson ; 'Neolithic Flints on Cannock Chase,' by T. C. Cantrill. There are also reports of the six sections ; and of Excursions and Evening Meetings.

Volume XXI. of the *Transactions of the Institution of Water Engineers* contains a number of interesting papers, among which we notice :—'The Alignment Diagram applied to the Flow of Water in Uniform and Compound Mains,' by D. Halton Thomson ; 'Plans and Records of Water Distribution Systems,' by Wm. P. Walker ; 'The Cross Hill Covered Service Reservoir for the Birkenhead Waterworks,' by W. J. E. Binnie ; 'The Rating of Waterworks,' by Charles Clifton. The volume is well illustrated by diagrams and illustrations from photographs, etc., and also contains an index to the 21 volumes so far published.

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THE NATURALIST.

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND

EDITED BY
T. SHEPPARD, M.Sc., F.G.S., F.R.G.S., F.S.A.Scot.,
THE MUSEUMS, HULL;
AND
T. W. WOODHEAD, Ph.D., M.Sc., F.L.S.,
TECHNICAL COLLEGE, HUDDERSFIELD.

WITH THE ASSISTANCE AS REFERRES IN SPECIAL DEPARTMENTS OF
J. GILBERT BAKER, F.R.S. F.L.S., GEO. T. PORRITT, F.L.S., F.E.S.,
Prof. P. F. KENDALL, M.Sc., F.G.S., JOHN W. TAYLOR, M.Sc.,
RILEY FORTUNE, F.Z.S.

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YORKSHIRE NATURALISTS' UNION.

VERTEBRATE ZOOLOGY SECTION.

THE meeting usually held in November will not take place this year. It is hoped to be able to hold the February meeting as usual, particulars of which will be given later.

For the purpose of electing Officers of the Section, members are requested to meet half an hour before the meeting of the general committee on the occasion of the Annual Meeting of the Union at Wakefield, Saturday, December 8th.

WALTER GREAVES (Hon. Sec.),
1 Chapel Avenue,
Hebden Bridge.

BOOKS WANTED.

M. Simpson. Fossils of Yorks. Lias. 12mo. 1st ed., 1855.
M. Simpson's Guide to Whitby. 1st ed. [before 1881].
Journ. Postal Micro. Soc. Vols. V.-IX.
Scientific Enquirer, 1886–
Internat. Journ. Micros. and Nat. Sci. 1891-97.
Journ. Micrology and Nat. Hist. Mirror. 1914–
Phillip's Geol. of Yorks. Vol. I., 2nd Ed. 1835.
Young and Bird. Geol. of Yorks. Coast. 2nd ed. 1828.
Derby Arch. and Nat. Hist. Soc. Parts 17, 18, 20, 21.
Journal Marine Biological Assoc. Vols I.-IV.
Croydon Nat Soc 6th Report, and Trans. for 1887-8.
Yorks Ramblers' Club Journal No. 8.
Newbury District Field Club Transactions. Vols. III. and on.
Reports Wakefield Lit. and Phil Soc Set.
Proc Birmingham Nat Hist and Phil. Soc. Vol. I., part 2.
Journ Manchester Geographical Soc. Vols. I., Nos. 1-9; Vol. III., Nos. 1-6; Vol. IV., all.
Proc Soc. of Antiquaries. 1st Series, Vols. I. and II.
Trans Manchester Geol. Soc. Vols. XV., XVI., XIX.-XXIII.
Transactions Burnley Literary and Scientific Club. Set.
Trans Barrow Nat Field Club. Vol. VII.
Dudley and Midland Geol etc., Soc. 1862-80 (14 parts).
Vale of Derwent Nat. Field Club. Old Series, Vols. I.-III.
Salisbury Field Club Transactions, Vol. II.
Trans. Norfolk and Norwich Nat. Soc. Vol. I., Parts 1 and 2; Vol. IV., Pt. 3.
Peterborough Natural History Society. Reports, 1-8, 11-12, 14-26.
Brighton and Sussex Natural History Society Reports, 1855-1870; 1872-3.
North Staffordshire Field Club Reports for 1866, 1869-1873, 1876.
Bedfordshire Natural History Society Proceedings. Set.
Trans. Royal Cornwall Geological Society. Set.
Chester Soc. Nat. Science: Ann. Reports, i.-iv.
Trans. Woolhope Club. 1866-80.
Quarterly Journal of Science. 1878-9, 1882-3, and 1885.
Trans. Geol. Soc., London, 4to. 2nd series, Vols. IV.-VII. (1836-56).
Geological Magazine, 1890-1-2-4.
Mackie's Geol. and Nat. Hist. Repository. Vols. II., III.
Proc. Liverpool Geol. Association. Parts 1, 3, 7, 16.
Reliquary (Jewitt's 8vo. Series). Vols. XXII. and XXIV.
Irish Naturalist. Vols. 1912-16.
Scottish Naturalist. 1881-95.
Annals of Scottish Nat. Hist. 1905-1916.
Walford's Antiquarian Mag. and Bibliographer for July-Dec., 1885.
Quart. Journ. Geol. Soc. Vols. I.-XIV.
Proc. Geol. Assoc. Vol. I. Part 1.
Trans. Yorks. Nat. Union. Part 1.
Naturalists' Journal. Vol. I.
W. Smith's New Geological Atlas of England and Wales. 1819-21.

Apply—**Editor, The Museum, Hull.**

JUN 24 1920
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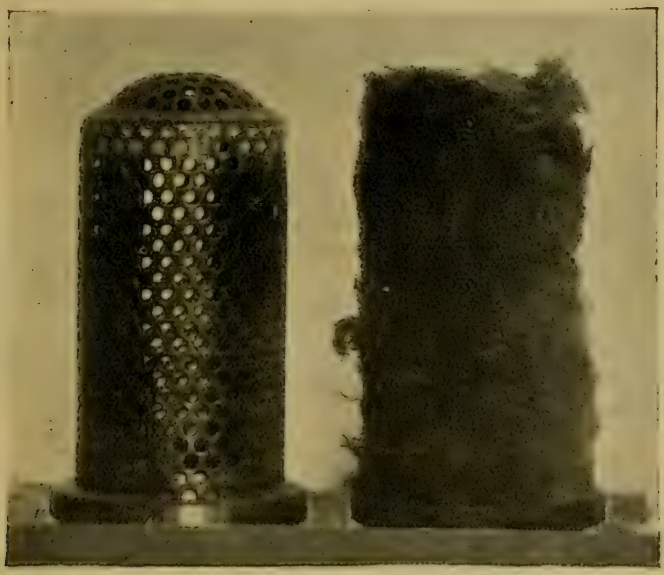
National

NOTES AND COMMENTS.

BIOLOGY OF WATERWORKS.

The British Museum (Natural History) has issued a handbook entitled 'The Biology of Waterworks,'* by R. Kirkpatrick. It deals with the purity of water supplies as affecting plant and animal life, and contains many useful hints of service to those interested in the subject. There are several illustrations, one of which we are permitted to reproduce it explains itself.



Water-meter Strainer clogged with branches of Polyzoa (two species); and new strainer, on the left, for comparison.

FAUNA AND FLORA OF WATER PIPES.

From the handbook we learn that: 'It has been proved by sad experience, in this country and abroad, that in a water-supply which is not protected by adequate filtration microscopic organisms such as Diatoms gain access to the pipes, and can there serve as food for animals which depend on this kind of nutriment. The chance introduction of a few "statoblasts," "gemmules," or other reproductive bodies may then be followed by the establishment of corresponding growths of Polyzoa, Sponges, or other animals on the walls of the water-pipes. Here they find a congenial home, sheltered from

* Economic Series, No. 7, 58 pp., 1/-

extremes of cold and heat, and provided with abundant Diatoms as food. New reproductive bodies are given off and effect a lodgement elsewhere, and carnivorous animals of various kinds prey on the colonies thus diffused. The final result may be the occurrence, in the water-pipes of a town, of thousands of individuals or masses the weight of which must be estimated in tons, of various fresh-water animals. Not only do these tend to restrict the effective size of the pipes, but their decay, especially at the approach of winter, sets free branches of Polyzoa and Hydroids, which give rise to serious trouble by blocking strainers and taps, besides resulting in the fouling of the water and the encouragement of the growth of Bacteria, some of which (the "Iron Bacteria") have the most far-reaching consequences.

BOTANICAL SOCIETY AND EXCHANGE CLUB.

There have recently been issued the report for 1916 of the Botanical Society and Exchange Club of the British Islands, Vol. IV., Pt. 5, pages 393 to 550, by Mr. G. Claridge Druce; also the Report of the Botanical Exchange Club, by Messrs. W. H. Pearsall and D. Lumb, Vol. IV., Pt. 6, pages 551 to 600; also Second Supplement to Botanical Society and Exchange Club Report for 1916, by G. Claridge Druce, pages 601 to 653. Each of these contains much matter of interest to northern botanists.

GEOTERESY.

In the *Journal of the Royal Geographical Society* Mr. W. Coldstream writes:—'I have found the need of a word to express the idea of operations for the protection of the suface of the earth. I found no single English word to express the idea. "Protective Forestry" covered a considerable part of that which had to be expressed, but not the whole, for there are other modes of protection besides planting; for instance, barrages, embankments, etc. Finding no general word for the purpose, I have proposed the word "Geoteresis" or "Geoteresy." (I suppose, if it came into English use, it would have the penultimate short.) It would include protection against (1) erosion by torrents, rivers and sea, and (2) submersion by those agencies, and also by sand drift and silt deposit. I venture to think that it would be convenient, and that it is almost a necessity, to have some such word in discussing such questions as the action of torrents, the denudation of the surface by forest clearings and excessive grazing, also erosion of river banks and also of the sea coast. Perhaps "Geoteresy," with its adjective "Geoteretic," is as convenient and expressive a word as can be found.'

THE PREVALENCE OF ANOPHELINES.

In connexion with possible risks of malaria being acquired in this country, the Local Government Board are anxious to collect as much information as possible at the present time regarding the prevalence and distribution of anopheline mosquitos in various parts of the country. Naturalists and field entomologists could give much valuable help in the matter :—(*a*) by keeping notes and records, *beginning at once*, of any adult insects which they may meet with during natural history searches, etc., and also of the detection of anopheline larvæ ; (*b*) by forwarding any information on the subject already in their possession.

RECORDS.

In making records the following are important :—

Adults : Date.
Hour of collection.
Place (if in a building, specify its nature).
Condition of weather and temperature.
Whether few or abundant.

Larvæ : Date.
Hour of collection.
Locality.
Nature of collection of water (natural or artificial).
Nature of breeding place (shady pools, open collections of water ; presence or absence of weed, fish, etc.).

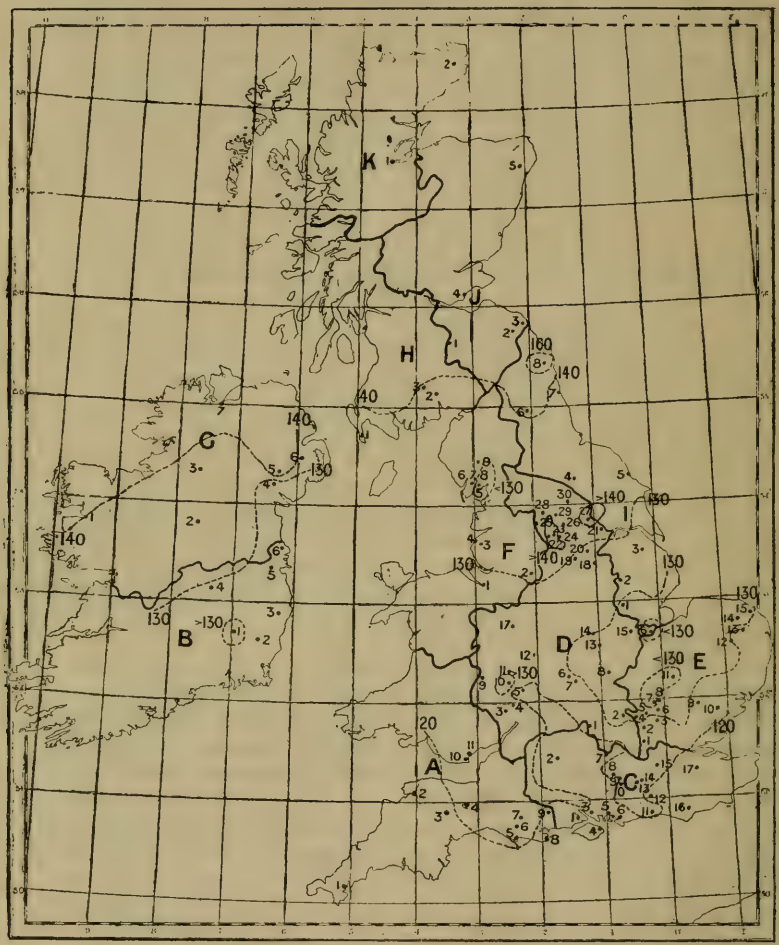
IDENTIFICATION.

As regards differentiation of anopheline from other species reference may be made to the British Museum pamphlet on Mosquitos (Economic Series No. 4, British Museum ; Price 1d.) or, of course, to any larger text books. In case of doubt as to the identity of insects collected, specimens may be sent for identification by post addressed (O.H.M.S.) to the Medical Officer, Local Government Board, Whitehall, London, S.W. 1., and marked on the cover ' Entomologist.' Letters relating to investigations (*a*) and (*b*) above should be similarly addressed.

PHENOLOGICAL OBSERVATIONS.

From Messrs. J. E. Clark and H. B. Adames, we have received their valuable Report on the Phenological Observations in the British Islands, from December, 1915, to November, 1916, reprinted from the *Quarterly Journal of the Royal Meteorological Society*. From this we learn that :—' When, in 1892, Mr. Mawley took over from the late Rev. T. A. Preston responsibility for the Annual Report, he entirely re-organised its

character. For twenty-two years he was solely responsible, the magnitude and consistent excellence of his annual labours placing the Phenological Report of our Society in the front rank among investigations into the inter-relation of biological



A. Fig. 1.—Phenological Provinces and Stations, 1916. Also Isophenes of 120, 130, 140 and 160 days.

and meteorological phenomena. So finely conceived was the basis of his organisation that his successors have endeavoured to retain his system practically unmodified. Any changes have been rather by way of additions, as in the case of the spring migrant returns. Thus, any investigator working upon

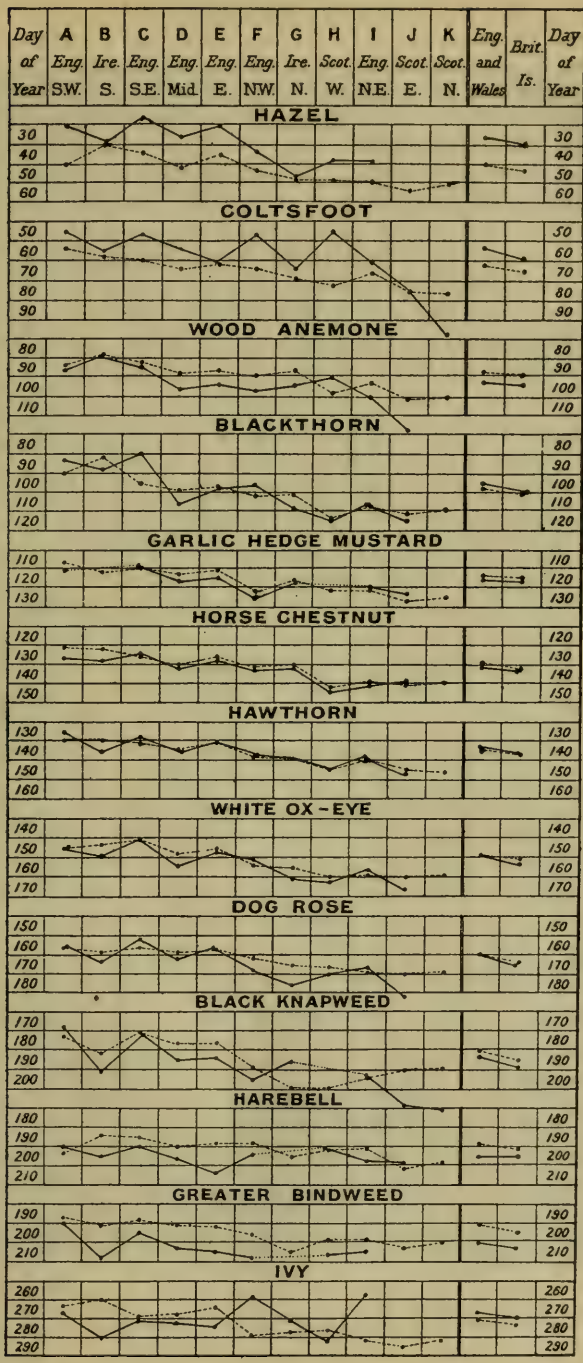


Fig. 2.—Dates of Flowering of Plants.

the records will find a homogeneity which greatly facilitates his labours, and the cumulative value increases more rapidly year by year. We cannot be too grateful for the perspicacity of him by whom the foundations of this ever-rising edifice were so well and truly laid.' The report certainly contains a wonderfully compact record of various observations made during the year. We are permitted to reproduce an interesting map which appears in the report, as well as a valuable table giving particulars of the dates of flowering plants.

THE ANTLER MOTH IN YORKSHIRE.

Mr. J. W. Carter writes:—'During the first week of September, I spent a few days at Malham, and had not been long in the village before I was told of the "great plague of caterpillars" they had experienced. I made enquiries of some of the farmers; Mr. Swinbank informed me that on their farm they had no fewer than 80 acres of grass-land on the Fells so badly infested that they had to remove all their cattle and sheep on to the land at a lower elevation—which was quite clear of the pest. Another farmer, less fortunate, had the *whole* of the land occupied by him so badly infested that he had to sell out his entire stock of cattle and sheep. The pretty moth was still on the wing during my visit.' We take this opportunity of reproducing the illustration referred to on page 308 of *The Naturalist* for October.

THE GREAT AUK.

In *The Museums Journal* for October, Mr. W. H. Mullens has an interesting paper on W. Bullock's London Museum. From this we gather—'When Mr. Bullock was at the Orkney Islands, he had the pleasure of chasing a male of this species for several hours, in a six-oared boat; but without being able to kill him, for though Mr. B. and his companions frequently got near him, so expert was the bird in its natural element that it appeared impossible to shoot him. The rapidity with which he pursued his course under water was almost incredible. The bird was, however, killed in the following year and came into Bullock's possession under the following circumstances, as set out by him on page 75 of the sixteenth edition of the *Companion*, 1814:—"The Great Auk or northern penguin (*Alca impennis*).—Of this rare and noble bird we have no account of any having been killed on the shores of Britain, except this specimen, for upwards of a hundred years; it was taken at Papa Westray, in Orkney, to the rocks of which it had resorted for several years, in the summer of 1813, and was finely preserved and sent to me by Miss Trail, of that island, a lady to whom I am under considerable obligations for procuring me many valuable and rare subjects from the northern isles, and much interesting information respecting their habits.

Larvæ of Antler Moth at base of wall.

I had the pleasure of examining this curious bird in its native element ; it is wholly incapable of flight, but so expert a diver that every effort to shoot it was ineffectual." '

SCIENCE TEACHING IN SECONDARY SCHOOLS.

The introduction to the ' Report on Science Teaching in Secondary Schools, issued by the British Association ' (86 pp., price 1/-) gives a short historical resumé of the Association's previous efforts to reform the teaching of science, dwelling more particularly on the heuristic phase of Armstrong and Miall. Some comparison is made of the time devoted to different branches of science in different types of Secondary Schools ; although the suggested proportion of $\frac{1}{6}$ for boys and $\frac{1}{7}$ for girls is not followed in the typical schemes which are given.

SCIENCE AND SCIENTIFIC METHOD.

It is pointed out that science, as distinguished from scientific method, has its own particular value in a curriculum, and that in teaching, the ' wonder motive ' arising from delight in natural phenomena, the ' utility motive ' which leads man to make use of nature and the ' systematising motive,' should all be recognised as inherent activities of a child's mind and should be cultivated in due order. Other subjects are the growing scarcity of teachers of science and their inadequate remuneration, the rarity of schools with a scientific Principal, the necessity for freedom in teaching and the advantages of basing examinations on a school's own scheme of studies.

SCIENTIFIC HISTORY.

There is little in the Report which is fresh or even freshly stated. Perhaps the most valuable items are the emphasis which is placed upon the rousing and humanising stimulus obtained by introducing more of the history of scientific discoveries and biographies of scientists, and the idea of leading more frequently *from* the great applications of science *to* the science of the laboratory experiments.

SCIENCE COURSES.

A group of typical Science Courses is given, concerning which the most curious fact is that almost without exception they are drawn from the South of England. Is there no science teaching worthy of consideration in the North of England or in Scotland, and are there no science teachers in the North capable of expressing their views on the subject ? It is unfortunate that what might have been a Report of the highest value at the present time should have left outside its limits the experience of the most vigorous industrial areas of the country, whilst at the same time it has provided so little inspiration or sound suggestion.

A BOY'S EDUCATION.

The most amazing of the typical courses is that drawn up by the Professor of Education in the University of London, and intended as suitable for boys between twelve and sixteen. In five hours per week a boy is expected to gain 'a real, if rudimentary, acquaintance with the true character of scientific enquiry' as exemplified in the sciences of Biology, Astronomy, General Physics, Heat and Chemistry—(Geology and Mechanics are allotted to other lesson periods). By fourteen, he appears to reach the matriculation stage in several of the subjects; by sixteen he has covered what looks like a Bachelor of Science Course, skimming lightly through such investigations as the theory of organic evolution, harmonic vibration of a compound pendulum, colours of thin films, polarisation, radio-activity, modern explosives, proximate constituents of food, chemical industries and processes. It may be suggested that it would not matter if the scheme were even extended, as, long before he reached the end of it, the boy would be dead. It has been said that to work this scheme out by heuristic methods would require a hundred years.

OTHER SCHEMES.

In the scheme for Oundle School, the value of workshop practice is dwelt upon; the headmaster of Shepton Mallet Grammar School correlates his science with the industries of the school district, but considers that lessons out of doors waste much valuable time, which is surely not unavoidable. The Courses for girls present no new features. Prof. Armstrong has a paper on Practical Food Studies, which is not new.

THE INTERGLACIAL PROBLEM.

In *Scientia*, (Bologna), Mr. W. B. Wright says: 'The epidemic of wild theorising which followed close upon the first great strides in the study of glacial geology gave place towards the close of the last century to a severely critical attitude, salutary, no doubt, but unstimulating. To the workers in this period of scepticism, all honour is due, for they carried forward with admirable judgment the work of clearing the ground upon which a saner edifice of thought might be built. As a result of their careful sifting of materials, it is now becoming increasingly possible to construct from the facts certain will founded generalisations, which indicate the directions in which progress may be made. Any advance of this kind would have been very difficult without the preliminary critical work of Lamplugh and Kendall in England, Geinitz in Germany, Holst in Sweden, and Wright and Upham in America. We are now in a position to put aside the complicated and artificial systems of the earlier interglacialists, and enquire without prejudice how far we are entitled to go in deducing the occurrence of milder epochs during the glacial period.'

THE KIRMINGTON DEPOSIT.

'As regard fossiliferous deposits occurring between beds of boulder clay, only a few have stood the test of critical examination. One is the estuarine clay of Kirmington in Yorkshire [should be Lincolnshire], in which the stratification is undisturbed and the shells occur in the position of growth embedded in the clay. It lies beneath the Hessle Clay which is part of the newer drift and on top of the Purple and Basement Clays which probably belong to the older drift. The deposit is undoubtedly in situ, but the locality is not very far from the margin of the newer drift and in consequence the amount of withdrawl directly demonstrated is not great. The fauna is not in any sense arctic, but beyond this does not afford data for more definite conclusions as to the climate.'

CORRELATION OF DEPOSITS.

'There can be little doubt that in time, with the advance of the study of Archæology and the facilities it affords for the dating of various stages in the glacial succession, much will be done in the way of correlating the epochs of advance and retreat in the different districts. By this means and by careful mapping of traceable ice-margins it may even be possible to bring the marine interglacial deposits into line with the terrestrial deposits and to form a proper estimate of the extent of retreat during each oscillation. It would seem as if little was to be expected from archæological researches in America, at least as regards correlation with Europe. How this difficulty is to be got over we cannot at present surmise, but we need have little doubt that, like others in the past, it will ultimately be overcome by the ingenuity and industry of man.'

PLANT DISEASES IN MUSEUMS.

We take the following from *The Museums Journal* for October:—'In a valuable presidential address to the Yorkshire Naturalists' Union (*The Naturalist,* June, 1917) Mr. W. N. Cheesman suggests that Museums should exhibit plants affected by fungi. "Full use," says he, "should be made of the British Museum booklets on Fungi and Mycetozoa (1s. and 3d. respectively) which are alone sufficient to enable students to recognise very many species commonly found in all districts." We are glad to note that renewed attention is being paid by the authorities to the illustrations of animal enemies of economic plants exhibited in the North Hall of the Natural History Museum. But why are not the plant enemies included in this series? They are quite as important. In North America, the annual loss on the potato crop from the attack of a single species of fungus is estimated at £7,000,000. This is one of at least eight fungi that attacks potatoes in our own islands. It might conceivably pay the nation to show them in its national museum.'

———

Naturalist,

NOTES ON THE FLORA OF RIBBLE-CRAVEN.

JOSEPH FRY PICKARD.

RESIDENCE for a few weeks of bad weather in August of this year at Overdale, Settle, enabled me to bring together a few notes which supplement the knowledge afforded by the books, etc., dealing with the area. One at least emphasises the fact that in undisturbed ground, plants may miss flowering for a season, but only very, very slowly 'miff' out altogether, although a tramper over their sites may well miss spotting them nine years out of ten. I made acquaintance with Mr. H. H. Sturdy, of Settle, well 'posted up' in the usual species characteristic of the region. Under his direction, and also of my own observation, I made a number of interesting 'finds,' and in one or two instances proved the long persistence of varieties, thought to be extinct, in situations further from the beaten track.

Berberis vulgaris, bushes, probably bird-sown, at Sannet Gill, above Stainforth, and near Bolton-by-Bowland.

Arenaria verna, sparingly on the Moughton limestone, probably due to the scarcity of lead in the formation hereabouts.

Arenaria gothica, still in some scattered plenty about Crummock plate limestone, together with *Sedum villosum*, which likes wet, and quantities of *Sagina nodosa*; but all of dwarf stature this year.

Acer campestre, apparently rare, but in evidence in hedges near Bolton-by-Bowland.

Potentilla procumbens, rather plentiful where the moory sand comes in, near Wigglesworth.

Pimpinella major, very characteristic of the hedge banks in the Wigglesworth district.

Galium mollugo, var. Stockdale Roadside, over Settle, 900 ft. Dr. Lees has dealt with this in *The Naturalist* for October. The type is to be seen about Horton and Settle, on road banks without hedges.

Inula dysenterica, a tall clump on hill-slope, above Sannet Gill, on sandy shales; an unusual site, for a pelophile; and curiously enough Mr. Shuffrey of Arncliffe, has placed on record a similar ecadic occurrence above Hawkswick, in the fall of another river-basin.

Campanula rapunculoides. By Stainforth Beck, in one place; first record for Ribble, showing the vigorous tendencies of creeping-root species, that can store up nutriment and survive dislocations.

Gentiana Pneumonanthe. Local observers who cover the ground at intervals through a year always upturn the most varieties. Mr. Sturdy confirms *The Naturalist* of 1910 (p.

357) that this heather gentian still thrives on the slope up from Clapham Station towards Keasden, at ' The Knotts.'

Erinus alpinus, a singularly interesting coloniser, following apparently upon the ' agger ' making labours of the Romans, occurs in many places from Chatburn to Bolton-by-Bowland, and appears to be increasing. First mentioned by Geo. Bentham in his Handbook of British Plants—4th edition of 1888, published just too late to be included in Dr. Lees' *Flora* of West Yorkshire. Most of the Stations are just within the South Lancashire boundaries, on natural rock faces left after making bridges. *Rumex scutatus* of alien origin occurs with it.

Verbascum Thapsus, over disturbed soil surfaces, etc., on Sannet Gill shales and grits.

Linaria repens, still retains its hold in the masonry abutting on Giggleswick Station and rail-bank, where I noted it first about 20 years ago. Dr. Lees says it appears to be the striped, erect form of *repens* L., equalling *L. striata* D.C., not the plant of Oxfordshire cornfields; perhaps brought from Arnside with limestone or shingle-ballast, but now found further down the line (Mr. Sturdy); anyway the first record for West Yorkshire, whatever its category of denizenship.

Veronica Buxbaumii (*Tournefortii* Gmelin). This agrestral colonist of quite recent introduction to the country (first known as British in 1829, Yorkshire, 1841), was pointed out to me by Mr. Sturdy by the roadside, beyond Langcliffe from Settle; first record for Ribble. This stranger has been overrun in its spread over the country by that remarkable ' pine-apple Maithweed,' *Matricaria suaveolens*, first brought from Chili with nitrates, within living memory, to become ubiquitous to-day wherever manure and cultivation go. I only noted a very little of it about Settle.

Juniperis communis var. *intermedia* Nyman, on Moughton, occurs in distinctly Ribble as well as Lune basin (also on Giggleswick Scars) but uncertain whether var. or type.

Polystichum Lonchitis (the Holly Fern) has been recently found (Sturdy and Wilson) to be survivant still on at least one of the higher Scars among *talus* over Settle in the direction of Malham. I saw it there in August, some six or eight fine plants !

Osmunda regalis, seen by Mr. H. H. Sturdy, near Rathmell in one place; no former record for Yorkshire Ribble. One record in the Stonyhurst List for near Leagram.

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The death is announced of Prof. Charles Latham, of the University of Glasgow. He was trained at the Wigan School of Mines, and for nine years had been director of Mining at University College, Nottingham.

SPHAGNA.

WM. INGHAM, B.A.,
York.

THIS is an old Greek name for some plant, thought by some to be *sage*, by others to be a *lichen*. The singular number is Sphagnum, a name first applied to these plants by Dillenius.

The popular names are *Bog mosses*, because they are so common in bogs; *Peat mosses*, because they form a constituent of peat; and *Sphagnum mosses* by those who use them in the treatment of soldiers' wounds.

Each plant is so delicate that it cannot stand upright by itself, and so we find the peat mosses in compact colonies in which the individual plants are close together and thus support one another. This compact growth leads to another important result, for it keeps the moisture, so important to these plants, within the tufts, and so well is this done that even in the driest summer the peat mosses are found to be wet if trod upon.

If the plants float on water, there is no need for compact masses, so in this case single plants are found floating.

Each plant, when dry, is lighter than a feather, on account of its very loose cellular structure, which is very beautiful under the microscope, and reminds one of very delicate lace-work.

One peat moss alone contains thousands of delicate leaves, all sessile on the main stem, and numerous branches. The leaves on the main stem are nearly always of different shape and structure from those on the branches, and these branches are mostly in tufts, some of the branches spreading out, and others lying along the main stem.

To aid in the diffusion of moisture the leaves in most cases are perforated by numerous pores, beautifully seen when a leaf is soaked in methyl violet, and then transferred to the microscope.

These mosses may be easily recognised in a walk over a moor, by their usually paler colour than the surrounding vegetation. They particularly delight in growing under the shade of heather, which must be drawn aside to see them.

The branches at the top of the stem are very much shortened and form a kind of head, known as the *capitulum*. By river sides, where sand has been deposited, the peat mosses are sometimes buried up to their capitula.

They often drape the sloping wet cliffs, and in this case the capitula point downwards. Early in the year they may be seen growing under water on the beds of pools, and in this case, should they be entangled with other vegetation such as *Pilularia globulifera*, they always remain on the bed, and can only be approached when the pool dries up.

They are of varied colours—white, green (the commonest colour), brown to nearly black, ruby-red, yellow, violet, purple, grey, flesh-coloured, rose-coloured, and sometimes variegated

with several of the above colours. On account of the very loose cellular structure, the very narrow chlorophyllose cells, the very large empty cells known as hyaline cells, and the numerous pores, water quickly permeates the whole plant by capillarity. So excellently adapted are they for obtaining water, that they can use the water in the moisture-laden atmosphere above them. They act, indeed, in Nature, as most delicate sponges.

Under the destructive action of sunlight, and when water is deficient, new growths start forth *above*. The lower parts of the plant die, and, being very brittle, often break off.

These plants can endure almost any amount of cold weather.

On 4th January, 1897, the writer found on Strensall Common a white peat moss in the middle of a block of ice. He took the ice home and melted it, the result being a beautiful white plant in excellent condition.

On the other hand, they are injured by heat, hence there are no peat mosses in the tropics.

It follows from the above that the natural habitat of these plants is the Temperate and Arctic regions of the Earth. They are recorded as extremely abundant in Siberia.

Sphagna are sometimes in pure masses, but often heather branches, needles of pine, winged seeds of alder and other impurities, are mixed with the tufts.

Also other plants are often mixed with them such as the true mosses *Aulacomnium palustre* and species of *Polytrichum*. Again, there is a true moss known as *Leucobryum glaucum*, which is often gathered for a Sphagnum by the uninitiated, but this last has none of the feather-like branches of the Sphagna, but only oblong-like leaves on the main stem. On account of the above impurities, we have places set apart during the present great war to pick over the Sphagnum mosses so as to separate them from the impurities.

These peat mosses, as we might infer from their wonderful structure, are of great use in Nature, and also in social life.

I.—In Nature.

1. Many streams on the hills and on the hill-slopes rise in peat-moss beds. The result is the water flows down gradually, and the supply is kept up.

2. On moorlands where they are abundant, on account of their capacity for retaining great quantities of water, in time of heavy rains they prevent flooding in the valleys below.

3. As the new plants grow on the old ones, in time they drain pools and make room for higher plants, such as trees.

4. Moist peat possesses a powerful antiseptic property, attributed to the presence of gallic acid and tannin; hence, under peat, in perfect preservation, there are not only ancient

trees, leaves, fruit, etc., but sometimes animal bodies. It may be said that bacteria cannot exist under peat mosses.

II.—In Social Life.

1. Sphagnum moss is now manufactured into blankets, carpets, rugs, wadding, paper, cardboard, and is an isolating material superior to cork.

2. They make excellent bedding material, and when they become lumpy, they can be restored to their original softness by being taken out and placed in water, and then dried in a shady place. As far as we know these plants can be wetted and dried for an indefinite time without being subject to decay.

3. The production of peat gas for power purposes has proved a success.

4. They are admirably adapted to spreading over the floors of stables, which are thus kept dry and clean, a result not to be obtained by using straw for that purpose.

5. The plants are used largely by gardeners in the cultivation of heaths and rhododendrons, and everyone is familiar with them on pots of orchids.

6. In a dry form they are sometimes used as a filling for pillows and mattresses, especially those used by invalids. They may also be wrapped around steam-pipes or packed in the walls of houses, where they act as a non-conducting substance.

7. In northern regions they are used for lining clothes, especially boots, and as wicks for lamps.

8. During the present great war, they are being extensively used in surgical dressing, being admirable for filling small pads to place upon wounds, because they are exceedingly light and also have the valuable property of being antiseptic. Another advantage is they are very plentiful in these islands.

In 1911, Warnstorf published his life's work on these plants, the book being known as *Sphagnologia Universalis*, dealing with the Sphagna of the whole world.

Probably that monumental work will stand for all time.

Mr. J. A. Wheldon, F.L.S., of Liverpool, has had the privilege of studying the above work, and based upon it, he produced in June, 1917, a Synopsis of the European Sphagna.

On account of the close connection Sphagna have with water, combined with their delicate structure, we should expect great variation, and this has led Warnstorf to adopt *forms*, but most of these are separated from their varieties by structural differences. Even colour with these plants has some importance, as the writer has found a ruby red Sphagnum in the middle of a yellow species, about three inches across, so the habitat in this case was not the cause of the difference in colour between the two species.

In Mr. Wheldon's Synopsis of the European Sphagna there are 59 species, 228 varieties and 407 forms known to the present time in the Continent, including the British Isles.

Of the above numbers there are so far recorded in the British Isles 45 species, 134 varieties and 258 forms.

It is clear, then, that the British Isles are very rich in Sphagna, not only in the numbers of species, varieties and forms, but in the quantity of plants as seen by the writer in his travels through the British Isles.

Appended is a list of Sphagna recorded for Yorkshire only, to June, 1917. The place where found precedes the name of the collector, and the writer is responsible for all those that end in a place only.

The writer is indebted to Mr. Wheldon and to the Synopsis for being able to bring most of his Sphagna to the new system as described in the *Sphagnologia Universalis.*

Yorkshire Species, Varieties and Forms.

Sphagnum fimbriatum Wils. Very common.
- var. *robustum* Braithw. (Near York) Anderson.
- var. *validius* Card., f. *spectabile* Warnst. (Wheeldale);
  - f. *compactum* W. (Saltersgate Beck).
- var. *intermedium* Russ., f. *densum* Wheld. (Strensall Com.).
- var. *tenue* Grav. Common, fruiting abundantly on Askham Bog.
- var. *laxifolium* W. (Arncliffe Wood, Goathland.)

S. Girgensohnii Russ. Not common.
- var. *robustum* W. (Cronkley Fell) Jones and Horrell.
  - f. *speciosum* W. (Cronkley Fell) Jones and Horrell, and (Black Hambleton).
  - f. *coryphæum* W. (Cronkley pastures) Horrell.
  - f. *laxifolium* W. (Cronkley Fell) Jones and Horrell.
- var. *microcephalum* W. (Cronkley Fell and Mickle Fell) Jones and Horrell, and (Wheeldale).
- var. *gracilescens* Grav. (Cronkley pastures) Jones and Horrell.
- var. *stachyodes* Russ. (Cronkley pastures) Jones and Horrell.

S. Russowii W. Not common.
- var. *Girgensohnioides* Russ. (Farngill.)
  - f. *flavescens* Russ. (Cronkley Fell) Jones and Horrell.
  - f. *virescens* Russ. (N.W. Yorks.) Wheldon, (Cronkley Fell and Mickle Fell) Jones and Horrell.
- var. *rhodochromum* Russ. (Cronkley Fell and pastures) Jones and Horrell, (near White Force).
- var. *poecilum* Russ. (Cronkley Fell) Jones and Horrell, and (Cronkley pastures).

(To be continued).

OLD NATURAL HISTORY MAGAZINES, ETC.

T. SHEPPARD, M.Sc., F.G.S.

"YORKSHIRE'S contribution to Science" can never be final, and though every effort was made in the volume with that title (which was reviewed in this journal for May, 1916, p. 150) to have the record as complete as possible, one or two items have been since brought to light, and one publication, *Wild Life*, though briefly referred to in the book, was not dealt with in detail. The following notes, therefore, are supplementary to the volume. The writer would feel grateful for particulars of any other publications not already noticed. The present opportunity is also taken of giving additional information in reference to some of the papers already reviewed, as a result of complete series having now been obtained. To Mr. A. Clarke, Mr. J. W. Carter, Mr. Mark L. Sykes, Mr. J. T. Sewell, J.P., and the Editor of *The Animal World*, I am indebted for the help given me in securing rare items.

WILD LIFE.

No 1 of this excellent illustrated monthly, edited by Douglas English, and sold at 2/6 a part, appeared in January, 1913, part 6 for June completing the first number. It is quarto in size. The first Volume contained 398 pages, and is illustrated by the fine photographs of various phases of life, many being on tinted mounts.

Vol. II. was completed in December, with 390 pages. The four parts, January to April, 1914, completed Volume III. with 230 pages.

Vol. IV. contained the parts May to August, 238 pages.

Vol. V. contains the four parts, September to December, 1914, the covers of which still show 'edited by Douglas English.' In the editorial with the December number signed by Douglas English and C. W. R. Knight, it is apparent that both these gentlemen were serving in the army, and the publication is not quite so large, there being a total of 124 pages for the four months September to December. The index was issued separately.

Vol. VI. contains the six parts January to June, 1915, the name of Mr. English disappearing from the cover with the April number. There is a total of 192 pages and index.

Apparently in 1915, the Company owning the paper had some financial trouble, but since then Mr. Edward E. Pettitt, of 38 Cursitor Street, E.C., took charge of the publication, and is now producing it.

Vol. VII. contained six parts from July to December, with a total of 232 pages, exclusive of insets. It still appears, the last part being Vol. IX., No. 9, for September, 1917.

THE WHITBY REPOSITORY: FIRST SERIES.

Of the new series of *The Whitby Repository* (2 vols. 1866-8) details have already been given (*loc. cit.* p. 87). Of the scarce old series, however, I had not been able to see more than a few odd parts, now in the Bradford Public Library, which were kindly lent to me by Mr. Butler Wood. Recently I have traced, and secured, a complete set of the nine volumes, many fortunately being in the original wrappers. Among the contributions are some observations on the possibility of coal occurring beneath Robin Hood's Bay, by William Smith, the geologist, which had previously escaped notice, and have been dealt with fully elsewhere.* As I have no knowledge of another set of this publication, the following particulars are given :—

The Publications are all octavo in size.

Vol. I. is entitled 'The Whitby Repository, and Monthly Miscellany: Religious, Sentimental, Literary, and Scientific. Volume first, 1825. Whitby: Printed and Published by R. Kirby, Bookseller, Bridge Street.' It contains the twelve monthly numbers for 1825 (385 pages), and a supplement, dealing with Kirkstall Abbey, etc., which, with the index, bring the total to 400 pages. It is in two columns, and we are informed on the last page that 'in future it will be printed on superior paper and not in columns.' As a frontispiece is a view of Kirkstall Abbey dated 1823, and there are a few other illustrations.

Vol. II., containing the parts for 1826, has iv.+392 pages, which, with a supplement and index, brings the total to 418 pages. There are some interesting plates.

Vol. III. for 1827 contains 428 pages, including the usual supplement, and a number of plates of Whitby Abbey, etc.

Vol. IV. for 1828, contains twelve monthly parts and index, totalling 398 pages.

Vol. V. for 1829, 388 pages.

Vol. VI., containing the parts 61 to 72 for 1830 (the last part is wrongly numbered 71) with index, contains 386 pages. From the original covers it would seem that this publication was still sold at 6d. per month.

In 1831, the publication appeared, but as 'Volume I.' of a new series, evidently under a different editor, the Rev Joseph Ketley. It contains 386 pages.

Vol. II. of the new series (parts 13 to 24 for 1832), 384 pages.

The last of this series containing the parts for 1833, has also 384 pages. The publication apparently came to an abrupt termination. Though there is a title page, there is no index, and some of the articles were 'to be continued.'

* 'William Smith: his Maps and Memoirs,' by the present writer, in *Proc. Yorks. Geol. Soc.*, Vol. XIX., Pt. 2, pp. 75-253.

YORK TOURIST SOCIETY.

'The York Tourist Society originated from a few friends joining together in excursions to Castle Eden Dene or Dell, in Durham, and the princely Chatsworth, in Derbyshire. These visits took place in the year 1865, when Edward Wade, Esq., J.P., was the Lord Mayor of the City of York, and accompanied the party.' Mr. Wade was the President, and Mr. Henry Brearey, Hon-Secretary. 'In course of time, the Society gradually increased in numbers, and Mr. R. W. Anderson has taken the place of Mr. Brearey as Hon. Secretary. It was not until the Spring of 1873, that any Tourist Papers were written, since then, however, the author, Dr. Procter, Mr. G. C. Baskett, Mr. J. L. Foster, and others, have occasionally illustrated the movements of the Society.'

The above particulars are taken from 'Tourist Rambles in Yorkshire, Lincolnshire, Durham, Northumberland and Derbyshire, by J. Brown, York, 1878.' 269 pp., a copy of which has recently come into my possession.

The first paper is 'Tours in Yorkshire,' an Address delivered at the York Institute on November 21st, 1876. Other papers deal with Wensleydale, Coningsboro' Castle, Wharfedale, Durham and Northumberland, Scoreby Woods, Pickering Castle, Lincolnshire, Saltburn, Teesdale, Durham, Derbyshire, Crayke Castle, etc., Burton Picture Gallery, York Roman City Wall, and the Eastern Question.

THE ANIMAL WORLD.

In January, 1906, appeared No. 1 of Volume I. of *The Animal World*, an illustrated quarto Magazine, published under the auspices of the R.S.P.C.A. It has been issued regularly ever since, the 12 monthly parts for each year forming a Volume, and each part is sold at 2d. The publication is devoted to the interests of the Society, and contains many Natural History notes and records. In recent years, the covers have been artistically coloured. Volume I. contained 320 pages, which has been the average number ever since.

THE ECONOMIC NATURALIST.

Through the kindness of a Huddersfield friend, I have recently obtained a complete set of this journal, consisting of 10 parts, the last two being numbered 9 and 10, and 11 and 12 respectively. Parts 1-8, January to August, were sold at 2d. each, the remaining two parts at 4d. In addition to the numbered pages are various supplements for labelling insects, printed on one side of the paper only. There are also other supplements, printed on both sides of the paper, which are separately numbered.*

* This description takes the place of that appearing in 'Yorkshire's Contribution to Science,' p. 146.

SELBORNE SOCIETY LETTERS.

Apparently the first publication of the Selborne Society had the above heading, and consisted of parts 1-12, dated January 1st to December, 1887. They were issued without covers, octavo, averaged eight pages, and were sold at 1d. each, though the December number, which consists of pages 137-158, and has a title, was sold at 2d. The nature of the publication can be ascertained from the following extract from the first page :—

' It is intended from time to time to issue Letters (after the manner of Gilbert White) on the objects and work of the Selborne Society, to be written by Members who have a special knowledge of the subject of which they treat.'

THE SELBORNE MAGAZINE.

On page 148 of ' Yorkshire's Contributions to Science,' I gave an account of *Nature Notes*, the Selborne Society's Magazine, and as my set commences with Vol. I. of that journal, dated 1890, I assumed that I had all the publications. Mr. Mark Webb informs me, however, that previous to *Nature Notes*, another Magazine was published, and I have since managed to obtain the two Volumes issued. They are small octavo in size, and are entitled *The Selborne Magazine*; No. 1 is dated January, 1888, and contains 16 pages. The publication was continued monthly, the Volume closing with page 192. Apparently some of the parts were re-issued, as the title pages of Nos. 2, 3 and 4 for February, March and April, state "second edition.' Unfortunately my copy of Vol. I. does not contain either title page or index. Vol. II., containing the monthly parts 13 to 24, dated from January to December, 1889, is similar in size to the preceding, and the title page reads :—' The Selborne Magazine for Lovers and Students of Living Nature, edited by Charles Roberts, Vol. II., 1889, London, John Bale & Sons, 87 Great Titchfield Street, W.' The index occupies 2 pages.

THE NATURALISTS' WORLD.*

Mr. Percy Lund has sent me a circular in reference to *The Naturalists' World*, on which occurs the words ' with which is incorporated The Practical Naturalist.' Volume I. of this journal was *printed* at Leeds, Vols. II. and III. at Ilkley, and Vol. IV. at Bradford.

(*To be continued*).

* See ' Yorkshire's Contribution to Science,' p. 104.

CUMBERLAND DRAGONFLIES.

F. H. DAY, F.E.S.

LEUCORRHINIA DUBIA Lind. Apparently a very local species in Cumberland, but I met with it in abundance in June and July last on Cumwhitton Moss. There are many similar 'mosses' in the county, most of which I have collected over, without however noticing this striking insect. The male is more abundant than the female. The flight of this species is somewhat slow, and it loves to skim over the surface of ponds and ditches, and hover gracefully over clumps of rushes or other aquatic vegetation, but it is easily alarmed and then darts off with a soaring flight far beyond the reach of a net. It also takes short, jerky flights over the heather, alighting on a patch of exposed peat, and tempting one into pursuit, but on the rough ground this is not always an easy matter.

Sympetrum scoticum Don. A typical 'moss" dragonfly, but at the same time decidedly local. It is common in the Bowness-on-Solway district. Other localities are Lazonby Fell, Orton, and near Keswick. It occurs throughout August. Occasionally it occurs in marshy meadows far away from its usual habitat. It haunts the ditches and ponds on the 'mosses,' but often indulges in flight over the heather. Owing to its inconspicuous colours, it is not easily followed. Examples of immature development are much easier to see when in flight.

Libellula quadrimaculata Linn. Another 'moss' species which I have taken on Bolton Fell, Newton Reigny, Bowness and Hayton Mosses. It is an earlier species than the last. My earliest date is May 25th. I saw many (and captured some) in the first week of August this year, which were getting tattered and faded, albeit still strong on the wing. I have sometimes found it resting among the heather on sunless days.

Orthetrum cærulescens Fabr. I captured a male of this insect in Borrowdale on June 30th, 1903 (*E.M.M.*, 1904, p. 111). I am unaware of its further occurrence in Cumberland.

Cordulegaster annulatus Latr. This species occurs with us only in the Lake district so far as I am aware. It is a most vigorous insect on the wing, often flying far out across the water and in consequence is difficult to capture, although not at all scarce. I have it noted from Derwentwater, Ullswater, Crummock and Buttermere, for the month of July.

Æschna juncea Linn. Fairly common in Cumberland. Localities are Orton, Newton Reigny Moss, Wan Fell, Cumwhitton Moss and Bowness Moss. In the first-named locality it frequents lanes on the outskirts of the wood, and I have found the nymphs in boggy ponds in clearings in the wood. The other localities are open peat mosses where the insect may

be freely observed shooting like an arrow over the pools and ditches. It occurs from the end of June to late September.

Æ. cyanea Müll. Scarce. I have only taken two specimens myself—both near Carlisle. It is more southerly in its range than the preceding species.*

Calopteryx virgo Linn. Frequents the edges of small streams which are fringed with osiers and alders. My only localities are the River Petteril near Carlisle, and the Derwent near Seathwaite. It is on the wing in June and July. I have not, however, seen it for some years, and have always considered it a rather scarce insect.

Pyrrhosoma nymphula Sulz. Common and widely distributed in this county, frequenting heaths, streamsides, and marshy ground in fir woods. I have even taken it in my garden. It seems most at home among the ponds on the peat mosses, its beautiful crimson colour (when mature) being very striking. It occurs from May to August.

Ischnura elegans Lind. One of our commonest species, occurring similarly to the last. Very abundant at the Black dub near Carlisle, and on Solway Moss. The middle of June is its usual time, but it lingers until August.

Agrion pulchellum Lind. Newton Reigny Moss near Penrith, June 25th, 1905, four specimens. It is possible this species may occur more generally. It may easily be overlooked for the closely allied *A. puella.*

A. puella Linn. Common. I have found it all over the county.

Enallagma cyathigerum Charp. Somewhat uncommon. I have it from Solway Moss, and Kingmoor, and it has occurred near Brampton and Keswick. My captures were made in June.

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MOLLUSCA.

***Vitrea lucida* at Louth, Lincs.**—About 1-30 p.m. on September 20th, my youngest daughter called my attention to a 'snail' crawling up the wall in our yard at 46 Westgate, Louth. This was a fine specimen of *Vitrea lucida*; when crawling the animal measured, from posterior extremity to tip of tentacle, 32 mm.; the animal and shell, alive, weighed 11 grains, the shell only 3 grains. Breadth of shell (greatest diameter) 16 mm., (smallest) 14 mm.; height of shell, 7 mm. When found, a number of mites were running about the animal. I believe this is only the second specimen recorded for the county.—C. S. CARTER, Louth.

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* In my experience *Æschna cyanea* is much commoner in Yorkshire than is *Æ. juncea*, especially in the southern division. This year, however, Dr. W. J. Fordh m found *Æ. juncea* in plenty on September 4th, at Bishopdale, near Buckden.—G.T.P.

PREHISTORIC REMAINS AT DONCASTER.

A. JORDAN.

FOUR or five years ago extensive alterations were carried out by removing the turf and levelling large areas on Doncaster Race Common. The race track was sunk in one part, and large elevated grounds were made near the grand stand.

During these alterations I paid constant visits, and on the Rose Hill side I found several neolithic flint flakes. A flint flake knife, nearly three inches long, of red flint ; the other flakes are blue, except one which is quite black. Near the grand stands I found a flint scraper and a flint disc.

The flint disc is a peculiar implement and its use not clear. It is found in varied numbers, often with the dead, and by early writers was thought to have been some sort of currency, possibly to pay toll on the journey to the next world.

Many years ago one of the finest polished axes ever found in Yorkshire was obtained on the Common, and is now in the Doncaster Museum ; also of interest was the discovery under the turf over a very large area, of long strips of land, like occupation plots, about forty feet wide and three to four hundred yards long.

They were in the southern part of the Common, at the foot of Rose Hill, parallel to each other, and each plot extending in a southerly direction.

I pointed this out to the Borough Surveyor, Mr. Kirby, who said he had noticed similar plots near the grand stand, which had been covered up before I saw them.

It is pleasant to think the Doncaster Race Common, which, in peace times, gives pleasure to thousands with its racing, was also the settlement of men in neolithic times, a people who built the foundation of our present life.

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YORKSHIRE NATURALISTS' UNION : BOTANICAL SECTION.

C. A. CHEETHAM.

THE annual meeting of this section was held at the Institute, Leeds, on Saturday, October 6th ; the President of the Section, Mr. E. Snelgrove, B.A., occupied the chair. Reports were submitted by the secretaries of the committees and, after discussion, were adopted for submission to the annual meeting of the Union, together with suggested alterations to the officers of the various committees.

Mr. E. Chas. Horrell gave an address on alien plants,

giving percentages of the various natural orders represented in the different area groups; his paper was illustrated by a large series of specimens, and evoked much interesting discussion. The spread of the Pineapple weed (*Matricaria discoidea*), which Mr. J. Beanland cited as a rarity thirty years ago and seen on Baildon Green, is now lining the roadsides by the loneliest farm buildings in the wildest localities, and seems an example of distribution more striking than the Canadian water weed of a previous generation.

Impatiens glandulifera which is now a feature of most of our river sides, as cited by Mr. W. B. Haley, is only a quite recent introduction; he also mentioned *Convolvulus americanus* as making headway on the banks of the Calder.

Dr. H. H. Corbett gave some particulars of the vegetation of Martin Beck Wood, on the border of Yorkshire and Nottinghamshire. The Doncaster Scientific Society have had permission to work here during the past year, and there are some interesting features. The wood is on the summit of a Bunter sand hill and has a local peat bog with *Myrica gale* and *Carduus pratensis*, the latter a very infrequent plant in Yorkshire; it is intended to publish a full report on the place later.

Dr. T. W. Woodhead, M.Sc., reported on some experiments the Huddersfield Corporation have made with Professor Bottomley's bacteriaized peat; he showed a number of photographs, the general results being disappointing, and the conclusion is that, on a commercial scale, it is unsuccessful, notwithstanding the striking laboratory experiments conducted with it on Duckweed in petrie dishes at the Imperial Institute.

Mr. Cockerline showed and commented on a series of plants collected around Arncliffe and Upper Wharfedale, and also some interesting sheets of *Ranunculus ficaria* to which his attention had been directed by Miss Johnstone's paper in *The Naturalist.*

Mr. W. H. Burrell had an exhibit of some of the most interesting mosses from the Leeds City area, which were recorded in his paper in *The Naturalist*, on pp. 119-124.

The experiment of an indoor meeting with papers, in place of the usual excursion, proved quite successful, the present difficulties of transit being the reason for the change.

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Unusual Sites of Starlings' Nests.—This year I found a Starling's nest in an old wall, where a stone had been removed. It was quite open and only about a foot from the ground. I found another perfectly open nest in a ruined windmill near York. Some bricks had fallen out, from the side of the doorway, below the eye level, and here a starling had built a nest in quite a Blackbird-like style.—R. FORTUNE.

In Memoriam.

ROBERT BRAITHWAITE.

Born at Ruswarp, 10th May, 1824.
Died in London, 20th October, 1917.

By the decease of Robert Braithwaite at the ripe age of ninety-three, bryological science has lost one of the greatest

of her votaries and Yorkshire one of the most distinguished of her sons.

Born at Ruswarp, near Whitby, on the 10th of May, 1824, he was not the least brilliant of the galaxy of botanists who have sprung from the soil of North-East Yorkshire, the worthy contemporary of such men as Spruce, Massee, Stabler, Ibbetson, to name but a few of those who have passed away, and whose survivors still remain in the honoured names of Matthew B. Slater and John Gilbert Baker.

He was the eldest son of Robert Braithwaite, a Whitby shipowner, but he did not remain long in his native county.

He studied for the medical profession, which he entered in 1858, taking his M.R.C.S.Eng. and L.S.A. qualifications in that year after study at University College, London. He took his M.D. degree at the University of St. Andrews in 1865, and his professional career was spent in the Metropolis, in the Clapham district.

He was a devoted student of the mosses, upon which he became one of the greatest authorities. In 1880, he produced a most important monograph of the Sphagnaceæ, or Peat-mosses of Europe and North America, with 29 coloured plates from his own drawings.

But in 1879 he commenced, and in 1905 completed, his great work, ' The British Moss-Flora,' which extended to three volumes—a truly monumental production—full and detailed in every respect, and illustrated by a series of fine plates from the author's own drawings and dissections; a work which will stand for years to come as the indispensable companion of every student of the British moss-flora, and which can never be superseded. The fact that other manuals on the British mosses have since appeared is but a further tribute to the excellence of Braithwaite's work, upon which, of necessity, all subsequent investigation must be based.

Devoted as he was to the completion of his *magnum opus*, there are not many smaller papers of his. The Royal Society's Catalogue of Scientific Papers enumerates 17, all on bryological subjects, published from 1868 to 1883 in *The Journal of Botany*, *Grevillea*, *Popular Science Review*, *Quekett Club Journal* and *Monthly Microscopical Journal*, those in the last-named periodical constituting a series of papers on bog-mosses, during the years 1871-5. To Trimen and Thiselton Dyer's Flora of Middlesex he contributed the list of mosses.

He was a Fellow, and attended Meetings, of various Societies in London. He became a Fellow of the Linnean Society on the 5th February, 1863, served as Vice-President in 1889-1891, and on the Council, 1872-74.

He was elected Fellow of the Royal Microscopical Society in 1866 and was President for the year 1892, his address, the subject of which was the ' Anatomy of Mosses,' being delivered on the 18th January, 1893, and subsequently printed in the *J.R.M.S.* for April, 1893, pp. 137-144.

He also took an active interest in the affairs of the Quekett Microscopical Club and in the Ray Society, in both of which he served on the Council. He was elected member of the Quekett Club on 27th October 1865, and was its President for the years 1872 and 1873.

He was President of the Yorkshire Naturalists' Union for

1895, and not by any means the least distinguished of the goodly array of Yorkshire scientific celebrities who have occupied that position. His presidential address, delivered on the 30th of October of that year at York, was upon "The Study of Mosses," and it is a gratifying recollection that one of the ablest of the Yorkshire bryologists of to-day traces his inspiration to that address. In this connection we should like to refer to *The Naturalist* for September 1903, where there is an illustration from a photograph showing Robert Braithwaite and Matthew B. Slater at Bowes, an interesting reminiscence of the two leaders in the kindred subjects of mosses and hepatics.

Of his private life we have little information—except that his marriage was into a botanical family—for in 1869, he wedded Charlotte Elizabeth, the daughter of the celebrated botanist, N. B. Ward, F.R.S., of Clapham Rise.

He retired from the practice of his profession in 1899, and in 1905 he completed his life's work by the publication of the final part of his British Mosses. Thenceforth, he continued to reside in suburban London, crowned with length of days and with the honour and respect felt for him by all who knew him and his works.—R.

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FIELD NOTES.

CECIDOLOGY.

Records of two rare Wasp-Galls (*Cynipidæ*) from Yorkshire.—Whilst collecting in the Leeds area last week-end, we found the following Wasp-Galls, both of which are worthy of record.

Aulacidea pilosellæ was added to the British List on examples found by Dr. J. W. H. Harrison and R. S. Bagnall in the county of Durham, where it is very local, but sometimes occurs in numbers. Close search for it in Northumberland and Lancashire on numerous occasions has always proved fruitless. It affects the midrib of *Hieracium pilosella*, causing a short swelling, generally discoloured yellowish to red, and containing a solitary yellow larva. A *Cecidomyid* midge causes an identical gall, but the larva is of an orange colour. YORKS., in a field near Bardsey (Barry Stewart).

Xestophanes brevitarsis Thoms. on *Potentilla tormentilla*, galls never fused. YORKS., Roundhay Park, Leeds (R. S. Bagnall).—RICHARD S. BAGNALL and BARRY STEWART, October 10th, 1917.

Galls of the Alpine Rose (*Rhododendron ferrugineum*).—Not long ago I spent a pleasant half-hour in my friend Mr. Lofthouse's moraine garden at Linthorpe, near Middlesbrough, and had the opportunity of examining some galled plants of

Rhododendron ferrugineum, finding the galls of a midge (*Perrisia rhododendroni* Kieff.), of a mite (*Eriophyes alpestris* Nal.) and a fungus (*Exobasidium rhododendri*), all of which are well enough known on the Continent, and are of interest to us as following the plant into garden cultivation. I do not know of previous British records.

Perrisia rhododendroni causes a bud-like gall at the extremity of a twig or branch. I only saw two larvæ.

Eriophyes alpestris (with another species, *Phyllocoptes thomasi*) exhibits signs of its presence in the longitudinal marginal rolling of the leaves. It also causes double flowers.

The fungus, *Exobasidium rhododendri*, causes most remarkable hypertrophies in the shape of cherry-like structures upon the leaves, sometimes attaining the size of a large walnut, pale at first, becoming reddish and shining. It appears in July, is known as the 'Alpine Rose Apple,' and is sweet to the taste. It seldom deforms the leaf and seems to follow the mite-gall.—R. S. Bagnall, F.L.S.

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LEPIDOPTERA.

Lepidoptera at Louth.—Convolvulus Hawk Moths have been fairly common this season in Louth and district. The first I saw was brought to me on September 1st, caught in Louth. The Peacock butterfly, which is usually somewhat rare here, has been fairly common, as also has the Red Admiral.—C. S. Carter, Louth.

***Chærocampa celerio* at Scarborough.**—On Sept. 13th a neighbour brought me a living Hawk Moth taken at rest on his garden gate. It was a stranger to me, but turned out to be *Chærocampa celerio* ♀. I wrote Mr. H. W. Head, of Burniston, as to the possibility of its being an escape from his 'butterfly farm,' but he replies that he has never once bred this insect. I have the specimen.—D. W. Bevan, Scarborough.

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HYMENOPTERA.

***Gonatopus pedestris* Dalm., in Cumberland.**—The interesting note and figure of this insect in *The Naturalist* (*antea* p. 276) reminded me that I had captured something like it. I have since had my specimen verified in London as *G. pedestris* Dalm. I beat it from Elder flowers in July last, on the 'Fell Road,' between Wath Brow and Egremont, in Cumberland. It was very active, running on my beating sheet like a *Pezomachus*. I should think its habits are predarious, its large eyes (occupying the whole of the sides of the head), the muscular anterior femora and peculiar arrangement and form of the tarsal claws suggesting this. Its prey may be

Formica fusca, which was not uncommon where my capture was made. There is a figure of it, along with some notes, in a paper on 'Insect Oddities,' by Mr. E. A. Butler, in *Knowledge* for 1902, p. 258. There is also an indifferent figure of it in Buckton's 'British Cicadæ.'—Jas. Murray, 2 Balfour Road, Carlisle.

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BOTANY.

Hedge Bedstraw in Wharfedale.—A funny—and punny—lapse was made by me, writing *currente calamo* in *The Naturalist* for October (p. 329), when I stated that the great Hedge Bedstraw had 'got' up Wharfedale *per vias naturalibus*, possibly fodder waggoned too, to 'Coniston Cold.' Meeting a farmerly fellow, who seemed to be a resident near the Bridge lane by Kilnsey, I asked him the name of the hamlet I saw couched on the north bank of the river, and he replied, I thought, 'It's cauld Coniston.' He meant—called, and I imagined it was 'Cold,' whereas it was I who was 'cold' as the children's 'findy' game has it. Mr. C. Cheetham detected the slip, and points out that Coniston Cold is near Malham, in Aire-Craven. Mr. J. Beanland adds that *now* this hedgebank straw grows as high as Hubberholme in the bed of the dale by Buckden, at quite 850 feet altitude. I quite credit it; in nature no zonal limit is a rigid barrier line. Ascending species, and Descending species overlap and bypass a given figure based on averages with *plus-minus* modifications in vegetative 'characters.'—F. A. Lees.

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BIRDS.

Starlings and Berries.—My elderberry trees, which were covered with fruit, have again been completely stripped by the starlings, which appear to relish the juicy fruit, for as fast as the berries have ripened they have cleared them. Several Mountain Ash trees were also covered with fruit, these too have also been quite cleared by the starlings.—R. Fortune.

Fowls and Aeroplanes.—We have aeroplanes almost daily over my house, sometimes a dozen at a time. It is very interesting to note the effect they have on my fowls. When the hum of the propellor is first heard, though the planes themselves cannot be seen, the birds bolt, helter-skelter, for cover under some large elderberry trees, remaining there until the last sound has been inaudible for some time.—R. Fortune.

Starling *v.* Blackbird.—A friend of mine living in Duchy Road, Harrogate, informs me that a Blackbird endeavoured to build a nest in a Yew Tree, opposite his dining-room window. The foundation of the nest was laid several

times, but each time a Starling came and went off with the materials to its own nesting site, This continued until the Blackbird became discouraged and sought a fresh nesting place.—R. FORTUNE.

Varieties of the Starling.—An albino starling, a bird of the year, was knocked down with a walking stick at Birstwith in June. The plumage was cream coloured, some of the feathers being edged with faint buff, the eyes being pink. A very noticeable bird is flying about our neighbourhood at the time of writing (October). His plumage is normal with the exception of the tail, which is quite white, making him very conspicuous, especially when flying.—R. FORTUNE.

Blackbird Singing in Severe Winter Weather.—Last spring when the conditions in Harrogate were almost Arctic, a blackbird which had frequented my garden all winter (he was without a tail, so easily recognised) sang daily before my window just before going to roost, which he regularly did in some ivy growing on the house side. He generally perched in a small chestnut tree. In early April when the weather was particularly severe, his song was rather half-hearted, but nevertheless he persisted. Afterwards, when the weather improved somewhat, he betook himself to a large elm, and the first sound I heard every morning was his song, for he had a particularly fine voice. Song Thrushes and many other birds suffered severely during last winter and spring, the mortality being very great, but strange to relate, Blackbirds did not suffer very much.—R. FORTUNE.

Notes on the Pied Wagtail.—The autumn of 1916 was remarkable for the great number of Pied Wagtails frequenting the neighbourhood of my house. I first noticed them particularly on August 31st, when a large flock of at least 200 birds was hawking about for insects, in quite a swallow-like manner. They were there for some time. After that date until September 15th, numbers passed over every evening from 7 to 7-30, flying in a direct line from north to south, and during the day they were to be seen in the roadways and on the lawns in every garden in the neighbourhood. I frequently had a dozen or more at one time in my garden. On September 7th, I was in the centre of the town when a large flock passed over, flying high, from the N.W. to the S.E. This movement continued throughout September. On Oct. 3rd the numbers about during the day had greatly diminished, and on the 7th I saw only five during the whole of the day, and after that they disappeared. I did not see any more until April 6th of this year, when to my surprise I saw a big flock of two to three hundred birds at the junction of Ripon Road and Swan Road ; this was in the early evening. They were scattered about on the roofs of

the houses and perched in some ash trees. Two houses in Ripon Road, had ornamental ridge coping tiles, with arrow-like heads every nine inches or so, and on every point a wagtail was perched. They were there again on the following evening, after which I saw them no more. This influx was particularly remarkable, owing to the severe wintry conditions then prevailing, thick snow and keen frost which had persisted for some weeks.—R. FORTUNE, Harrogate.

Nesting of the Long-tailed Titmouse in Upper Wharfedale.—During the last few years there has been good evidence that the Long-tailed Tit has been returning to this district. At the first small parties were reported in the non-breeding months of the year; but last summer (ante 1916, p. 267 and 1917, p. 36), we were pretty certain that at the least two pairs nested in Bolton Woods, and another pair in the Middleton Wood, on the opposite of the river Wharfe to Ilkley; but with our limited leisure we were not able to actually locate a nest. On June 9th, of this year, Mr. T. Roose showed me a nest of this species in Bolton Woods, not very far from the Abbey; but across the river. It was in a most unusual situation for a nest of the Long-tailed Tit, and was difficult to see, being in the broad bare fork of a tall Ash tree, and at the least forty-five feet from the ground. At that distance it exactly matched the Ash bark and the lichens upon it. The birds, or at least one bird, was feeding young in the nest, and by their actions I judged that the nest contained recently-hatched chicks. That is if this species behaves like the other Titmice; which with newly-hatched babes, the female alone enters the nest with food. The male attends her on her excursions for food, and returns with her to within two or three yards of the nest. He then hops about with an occasional note, or a subdued snatch of his song, until she comes out of the nest; when he again accompanies her on her journey. In two or three days he takes his share in the feeding of the family and before long both work independently and indefatigably. However, as this was the first nest of the Long-tailed Tit I had seen in Upper Wharfedale (or in Upper Airedale) for near, if not quite, a quarter of a century (ante 1909, pp. 55-57), I was naturally delighted to watch them at work. The same day, I saw another pair in the same woods on the island higher up the river—but failed to find evidence of their nesting—though most probably they would be.—HARRY B. BOOTH, Ben Rhydding.

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Hull Museum Publication, No. 112 (32 pp. and plates, price one penny) contains reprints of illustrated papers on Bronze-Age weapons, and on a new Lima from the English Chalk, by Mr. T. Sheppard, M.Sc., and several papers on Iceland Mollusca, by Mr. Hans Schlesch.

NORTHERN NEWS, etc.

The death is announced of Prof. C. E. Bertrand, the palæobotanist.

The Journal of the Board of Agriculture for September contains an illustrated article on ' Blackleg ' or Black Stem-Rot in potatoes.

In the Annals of the South African Museum, Vol. XVII., pt. 1, the Rev. T. R. R. Stebbing, F.R.S., contributes part 9 of his monograph on ' South African Crustacea.'

In *Nature* for October 25th Mr. E. E. Lowe, of the Leicester Museum, gives the results of some of his researches in connexion with the ' Isle of Wight Disease ' in the Honey Bee.

Punch tells us that to catch a butterfly, the best way is to crash a chopper down on its third vertebra. Of course this is a joke, as *Punch knows* butterflies have no vertebræ.

The Entomologist's Record for October contains a paper on ' New and Rare British Cecidomyidæ,' by R. S. Bagnall and J. W. H. Harrison, which includes a number of northern records.

In Vol. IX., part 3 of the *Annotationes Zoologicæ Japonenses*, Madoka Sasaki has a note ' On the male of *Amphitretus pelagicus* Hoyle,' and also ' Diagnoses of Four New Species of Polypus.'

We have received a ' Report of a Speech by the Right Hon. R. E. Prothero, M.P., addressed to Agriculturists at the Mechanics' Institute, Darlington, Friday, 5th October, 1917 (12 pages), published by Darling and Son, Ltd., Bacon Street, E.2.

In the presidential address to the Manchester Literary and Philosophical Society recently, Mr. W. Thompson gave a sketch of the Society's work since its inauguration in 1781, as a continuation of the Warrington Academy, which was founded in 1757.

The Royal College of Surgeons has issued an interesting *Descriptive Catalogue of the Surgical Instruments* (*Hunterian Relics*). (16 pages), prepared by Alban H. G. Doran. It includes illustrations of various instruments and other relics once the property of John Hunter, each of which is carefully described.

Our old friend and contributor Mr. J. G. Baker, F.R.S., favours us with a reprint of his paper on ' the Botany of Burnham Beeches,' from *The Journal of Botany*; and Mr. D. A. Jones sends reprints of his papers on ' New Varieties of British Mosses, Muscineæ of Achill Island, and the Mosses and Hepatics of the South-west of Anglesey.

Among the contents of *Wild Life* for September, are papers on ' The Marsh Harrier,' by A Burdet; ' The Story of a Long-Eared Owl,' by Edwin L. Wood; ' Abnormal Colour in Mammals,' by Dr. F. D. Welch; ' Botanical Notes from Watlington, Oxon,' by G. Abbey; most of which are illustrated in the familiar way. There is an illustration of a Bearded Tit at its nest, apparently a Norfolk example.

The death is announced of Prof. Edward Hull, F.R.S., in his eighty-ninth year. Prof. Hull was late Director of the Geological Survey of Ireland. He wrote a number of books and papers on the Coalfields of Britain and wrote or contributed to a large number of Geological Survey Memoirs, and maps, many of which referred to the north of England. In the recently published ' Bibliography of Yorkshire Geology,' he is responsible for about thirty items.

We much regret to record the death of George Charles Crick, of the Geological Department of the British Museum, which occurred on October 18th. He was born in 1856. He made a special study of fossil Cephalopoda, and was one of the best authorities on that subject. Though he has been in failing health for some time, he was at work at the Museum until the day before his death. He contributed to many scientific Societies' Proceedings and Journals, including *The Naturalist*.

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2. LACKEY MOTH.—Egg, Caterpillar, Nest, Cocoons, Female Lackey Moth, Egg Cluster.
3. SMALL ERMINE MOTH.—Eggs, Caterpillar, Cocoons, Ermine Moth, Nest in Apple Tree.
4. GOOSEBERRY SAWFLY.—Egg, Larva, Larva (last stage), Leaf, Sawfly, Branch, Cocoon.
5. ASPARAGUS BEETLE.—Eggs, Larva, Beetle, Pupa, Asparagus stripped of leaves, Cocoon.
6. BLACK CURRANT MITE.—Mite, Big Bud on Branch, Section of Bud with Mites.
7. RASPBERRY STEM BUD CATERPILLAR.—Caterpillar, Chrysalis, Moth (enlarged), Raspberry Cane.
8. MILLIPEDES and CENTIPEDES.—Three destructive Millipedes and two useful Centipedes.
9. SCALE.—Currant Scale, Scale on Aralia and Myrtle Leaves and Mussel Scale.
10. WIREWORMS.—Click Beetle and Skip Jack showing details.
11. PEA THRIPS, COCKCHAFER, DADDY LONGLEGS, WOOD-LOUSE and EARWIG, showing sections and details.
12. SOME USEFUL INSECTS.—Dragon Fly, Ichneumon Fly, Lady Bird, Tiger Beetle, Hover Fly, Glow Worm, Cocktail Beetle, Lacewing Fly.

All the designs are printed on appropriately tinted backgrounds, devoid of any white border, thus enabling the various sections on the Charts to be seen with great clearness.

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THE NATURALIST

A MONTHLY ILLUSTRATED JOURNAL OF
NATURAL HISTORY FOR THE NORTH OF ENGLAND.

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RILEY FORTUNE, F.Z.S.

JUN 5 1918
National Museum

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NOTES AND COMMENTS.

PRIMITIVE MAN.

Prof. G. Elliot Smith, F.R.S., has published a pamphlet with the above title.* At the outset he states that: 'The term "prehistoric," and especially the unpardonable word "prehistory" must be renounced, or used only in the most general sense, by all who value clearness of thought and precision of statement. When the adjective first came into use there was a vast break of unknown extent between the history of man that has been preserved in written documents and the complementary story that was recorded in what was then the less legible palimpsest of bones, implements, and potsherds. With the accumulation of further information and the acquisition of a fuller insight into the meaning of the latter kind of evidence, not only has the gap between the historical and the so-called "prehistoric" been to a large extent bridged, and by evidence of contact between neighbouring peoples the two "ages" been shown to overlap, but the unwritten records preserved in the bones and cultural remains have become more and more comprehensible, and have given us perhaps a fuller and more truthful history of certain phases of man's activities than the written documents, often coloured and distorted by the personal bias of their authors, which it has been the custom to regard as the only sources of real history.'

UNWRITTEN HISTORY.

'One has only to recall the recently acquired knowledge of the archæology of Crete and Nubia, for example, to realise the vastness and the accuracy of the body of history that has been recovered from sources other than literary records. Not only have such researches revealed a very extensive chapter of positive history, but they have shed a new light upon the hitherto accepted interpretation of the written documents and forced a considerable re-orientation of the ideas which they had provided of the growth of civilisation. With the widening of outlook and the growth of conception of continuity in history, the term "prehistoric" has, in fact, lost much of its usefulness. It has now become a hindrance rather than a help to those who are striving to obtain a clear view and a right perspective of Man's history as a closely interrelated whole and of the essential unity of civilisation. Hence, except perhaps in the case of some small localised area, it would be a distinct advantage if the word "prehistoric," and all the misleading and confusing glamour that has grown up in association with it, were relegated to the oblivion of the past to which it naturally belongs.'

---

* Oxford University Press. 50 pp., 3/6.

THE PILTDOWN MAN.

Speaking of the Piltdown remains, the author states: 'Certain palæontologists still persist in claiming that the jaw is a chimpanzee's and did not belong to the human skull with which it was found. But this claim ignores, not merely the improbability of such a chance association on the same spot of the remains of a hitherto unknown man-like ape and equally unknown ape-like man, one of which left his skull without the jaw and the other the jaw without the skull, but also the large series of anatomical peculiarities of the jaw and teeth which, as Mr. Pycraft has clearly demonstrated, prove the jaw to be, not a chimpanzee's, but that of a primitive human being—no doubt a part of the same individual whose skull was deposited alongside it. The outstanding interest of the Piltdown skull is the confirmation it affords of the view that in the evolution of man the brain led the way. It is the veriest truism that man has emerged from the simian state in virtue of enrichment of the structure of his mind. It is singular that so much biological speculation has neglected to give adequate recognition to this cardinal fact. The brain attained what may be termed the human rank at a time when the jaws and face, and no doubt the body also, still retained much of the uncouthness of man's simian ancestors. In other words, man at first so far as his general appearance and "build" are concerned, was merely an ape with an overgrown brain. The importance of the Piltdown skull lies in the fact that it affords tangible confirmation of these inferences.'

MANCHESTER GEOLOGICAL AND MINING SOCIETY.

In the *Transactions of the Manchester Geological and Mining Society*, Vol. XXXV., Part 4, Dr. George Hickling has a well illustrated 'Contribution towards the Micro-Petrology of Coal.' In this he concludes:—'There would seem to be little doubt that in due course a satisfactory classification, which will link up the past history and the present qualities of different coals, will be made possible. As yet, however, we are far from possessing the necessary mass of observations. It is perhaps justifiable at this stage to classify coals into the three following groups:—(1) HUMIC COALS.—In this type "lignitoid" constitutents predominate, and are, as a rule, of medium depth of colour. Partings of "mother-of-coal" are fairly frequent. The oval or flocculent bodies are not uncommon. Spore-coats are relatively scarce, and "algæ" are absent. (2) CANNELOID, including true cannels and spore-coals. The two dominant constitutents are pale-coloured spore-coals and dark or even opaque finely-comminuted matrix. "Lignitoid" lenticles of appreciable size are subordinate in quantity. "Mother-of-coal" is less frequent;

"Algæ" may be present; when these bodies increase in quantities the type passes into the one following. (3) Bog-heads.—Here very pale-coloured "algæ" form the principal and sometimes almost exclusive constitutent, as in torbanite and kerosene shale. A matrix like that of the cannels may be present in varying amount, as also may spore-coats and patches of "bituminous" material. Of these three types, the first is so named by Potonié, while the second and third form his sapropelic group.'

THE INGLETON SLATES.

In *The Proceedings of the Geologists' Association* (Vol. XXVIII., part 2), in a 'Note on the Correlation of the Ingleton Slates,' Mr. J. F. N. Green considers 'that the Ingleton Slates and Grits must go back into the Bala as the base of the Coniston Limestone Series. They show that Borrowdale Volcanics, with their associated acid intrusions, extended in force many miles south of their present exposures. They give a glimpse of the vast denudation undergone by that series in Ordovician time.' He also doubts whether the thickness of 800 feet assigned to the 'granite' can be substantiated. It seemed to him a mere shoal of no great size. Most of the quarry is in mudstone and sandstone.

STUDIES IN EDRIOASTEROIDEA.

Readers of *The Geological Magazine* during the last fifteen years will remember the various scholarly papers by Dr. F. A. Bather dealing with certain complicated forms of Echinoderms, many of which have been illustrated by admirable plates. Dr. Bather has already earned the gratitude of students of this difficult group by the careful and detailed descriptions he has given of many of the forms. He has recently still more assisted these workers, by reprinting under one cover his various contributions, with the title of 'Studies in Edrioasteroidea, I.-IX.' These are published by the author at 'Fabo' Marryat Road, Wimbledon, at the price of 10/-. The book contains over 400 pages, has a preface and an index, and there is no doubt it will be of considerable service in its present form. The original pagination etc., of *The Geological Magazine* has also been retained, so as to prevent confusion in the way of references. Dr. Bather is the best English authority we have on this subject, hence anything from his pen is worthy of permanent preservation. We are glad to notice that the work is thread sewn, and not stabbed through by wire.

SCIENCE PROGRESS.

Science Progress for October contains the usual summaries of recent advances in Science, by specialists; a number of notes, essays and reviews; as well as the following papers:—

Perturbations in Modern Physical Philosophy, by Sir Oliver Lodge; Newton and the Colours of the Spectrum, by R. A. Houstoun; Dispersoidology and the Theory of v. Weimarn, by S. C. Bradford; The Nature of Sun Spots, by Rev. A. L. Cortie. This part contains nothing from the pen of Mr. J. Reid Moir, but in his place Mr. W. J. Abbott writes on Prehistoric Classification. Judging from a table given on page 280, prehistoric remains are now, according to Mr. Abbott, to be classified as follows :—Last Hastingian, Azilian, Kemsingian, First Hastingian, Fairlightian, Cissburian, Ebbsfleetian, Preswichian, [surely the word should be Prestwichian, if used at all?], Oldburian, Upper Ashian ?, Strepyan ?, Fawkhamian, Meridionalis Gravels, Norwichian, Ipswichian, Mesvenian ?, Mafflien ?, Rutelian, Lower Ashion, Stanstedian, Suttonian. We fear, however, that this somewhat complicated system is in a nebulous state at present.

HUDDERSFIELD NATURALISTS.

We are glad to see that the Huddersfield Naturalist and Photographic Society continues to publish its Annual Report, and has a substantial sum in the hands of the Treasurer. That for 1917 is a useful summary of the natural history work in the district during the previous year. Mr. C. Mosley's 'Natural History Report' refers to interesting lectures by H. E. Wroot, J. R. Simpson, W. Falconer, F. Rhodes and A. Gilligan. There is an antiquarian report by J. H. Carter and F. Lee; Mr. A. Dean reports on Mammals, Mr. E. Fisher on Birds, Mr. C. Mosley on Entomology, Mr. W. E. L. Wattam on Botany, Dr. Woodhead on Geology, and Mr. G. H. Charlesworth records *Valvox globator* on Almondbury Common. Mr. G. T. Porritt refers to the abundance of *Sciaphila conspersana, S. pascuana, Charæas graminis, Tanagra atrata, Boarmia geminaria, Halia waveria* and *Abraxas grossulariata*. There are obituary articles of A. W. Whiteley and J. Cook, and a plate contains two interesting blocks of local interest from *The Naturalist*.

BEDFORDSHIRE.

The Cambridge University Press continues to publish its valuable county geographies at the low price of 1s. 6d. each, with coloured Geological and Physical maps, and numerous illustrations in the text; bound in a good cloth cover. The latest issued is entitled 'Bedfordshire.' and is by C. G. Chambers (195 pp.). It is based on the familiar plan, and the chapters of particular interest to our readers are those dealing with Surface and General Features, Rivers, Geology, and Natural History. From the geographical position of the county, and the nature of many old-time industries still existing, this Bedfordshire volume quite equals in interest any that have so far been published.

PREHISTORIC SOCIETY OF EAST ANGLIA.

We have received Volume II., Part 3, of the *Proceedings* of this Society (pp. 329-466, price 3s. 6d.). We are glad to find that the editor, Mr. W. G. Clarke, boldly enters the lions' den with a paper on 'Are Grime's Graves Neolithic?' In this he fearlessly challenges the views held by Mr. Reginald Smith and others, and we quite agree that Mr. Clarke makes out a very good case indeed in favour to the comparative late age of the Grime's Graves, as opposed to the 'Cave' date held by Mr. Smith and his East Anglian satellites. We have long held the opinion now so well expressed by Mr. Clarke, especially as in and around the Yorkshire barrows many of the objects recorded in the Grime's Graves can be matched. At any rate, in the Wold area, we have not even the nebulus evidence of remains of the 'Cave' period that sometimes seems to exist in East Anglia.

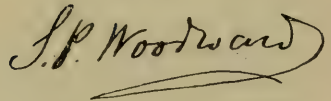
OTHER PAPERS.

There are the usual number of well-illustrated papers on such subjects as we expect from our friends in East Anglia, for instance, 'Chipped Flints from below the Boulder Clay at Hertford,' 'Flat-faced Palæoliths from Farnham,' etc. Mr. J. Reid Moir has a characteristic paper on the 'Position of Prehistoric Research in England,' (later referred to as *Prehistorical* Research!), in which he tells the old, old story of his researches and experiments in the chipping of flints. He seems impressed by the Rev. F. Smith's book on 'The Stone Ages in North Britain and Ireland,' a review of which appears in *The Naturalist* for 1909, pp. 224-5, to which we should like to draw Mr. Moir's attention. Another characteristic contribution of Mr. Moir's follows, in which he has to correct no fewer than 30 errors in a list of shells from the Crags, which he published in a previous volume. Mr. Peake deals very fully with further excavations at Grime's Graves (called 'Gfaves' in the heading), in which he describes many interesting implements, though some of these, for example, 'a heavy wedge-shaped implement about 9 inches long which can only have been used with two hands for chopping, though it is possible it formed part of a trap for killing deer,' are hardly convincing. He also figures a bronze spear head, which he found himself on one of the floors, and in view of the great age usually ascribed to the Grime's Graves, we can only hope that this Bronze-Age weapon is a later intrusion.

MONOGRAPH OF MOLLUSCA.

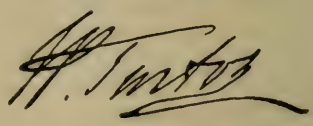
We have received Part 23 of Mr. J. W. Taylor's *Monograph of the Land and Freshwater Mollusca of the British Isles*, which includes a description of a new Genus, *Ashfordia*, 'instituted

for the reception of the *Helix granulata* of Alder, whose internal structure is so strikingly different from that of *Hygromia* that they cannot logically be grouped together, although the shells are so similar in their general aspect.' The name *Ashfordia* is here proposed to emphasize the peculiarities presented by the typical species and also to honour and perpetuate the memory of the late Mr. Charles Ashford. There are also descriptions of *Hygromia umbrosa*, *Theba cantiana* and *T. cartusiana*. There are the usual illustrations, distribution maps, etc., and an admirable coloured plate of the representatives of the three genera mentioned, some of the species being Yorkshire examples.



PORTRAITS.

Mr. Taylor follows the usual practice of illustrating his descriptions by portraits of well-known conchologists, two of which we are kindly permitted to reproduce. The first is of S. P. Woodward, whose 'Manual of Recent and Fossil Mollusca' has helped so many beginners in this special branch of Natural History. The other is a somewhat extraordinary illustration, and we must admit that it did not occur to us that it was a portrait until we read the description :—'The Portrait of Dr. Turton, herewith given from the Title-page of the "Conchological Dictionary," is in the form of an ornament constituted by two facial profiles, a right and a left, placed *vis a vis*, and separated by a dark background, which represents a classical vase, whose two sides form the facial outline of Dr. Turton.'



THE MUSEUM.

With the above title, 'A Manual of the Housing and Care of Art Collections,' by Margaret Talbot Jackson, has been

published in New York, by Longmans, Green & Co.* The writer has spent several years in visiting various European and American museums, and records her impressions in this volume. These are classified under various headings, and her general conclusions are well worthy of consideration, especially by those about to build new museums. She has principally devoted her time to art museums and galleries, but in her visits she has paid rather too much attention to the icing and neglected the cake. For instance, in England, she examined the galleries and museums at London, Liverpool and Oxford only; on the Continent it is the great national museums that chiefly attracted her attention—and condemnation.

FUTURE MUSEUMS.

She says, 'As regards growth, it is to be hoped that the museums of the future are going to be very different from the museums of the past, and that we shall learn that economy in running a large plant is not the only consideration. Such monstrosities as The Louvre in Paris, the South Kensington in London, and the Metropolitan in New York, will no longer be possible, but their places will be taken by museums of moderate size, devoted not to all art from earliest times to the present day, but to different periods or classes of material, and we shall then have museums dotted about in the different quarters of the city, where they will reach a larger number of people and where one can spend, in intimate association with a series of objects, a number of hours, without the overwhelming sense of fatigue that comes to the weary visitor, who knows that although he is now in gallery number 22, there are fifty-seven that he has not seen, and through which he may possibly have to pass before emerging from the building. It is very much more interesting to go to ten different places than it is to go to the same place ten times.'

ARCHITECTS AND MUSEUMS.

And again: 'Until our Trustees realize that the architect is not an omniscient being, blunders are going to be made in our museums. So far, few architects have specialized in museum buildings, and the subject is so vast that it cannot be mastered off-hand. It is the part of the museum specialist, the director, to guide the architect in the development of the plans. Therefore the first step in planning a new museum is not to open a competition for the designs of the building, but to choose a Director; who the architect is matters very little after that, provided both he and the Director understand their business.'

TYPES OF MUESUMS.

In a museum at Cologne 'the type of case which would best display the object was first considered, then the kind of

* 280 pp. 6/6 net.

light and size of room that would be most effective, and finally the exterior which would fit this interior. It would be perfectly possible to build a museum of concrete or brick that would be better adapted to the collections than the usual marble structure, and the saving in expense would be sufficient to ensure adequate equipment for carrying on the work of the institution. This is a point too often neglected. Many officials are looking toward the future for a type of museum building all on one floor, which shall be without stairs.' Other subjects discussed are lights, offices, workshop, restaurants, decoration, floors, furniture, cases, etc.

MODERN MAN AND HIS FORERUNNERS.*

Though the author gives a synopsis at the heading of each chapter, and deals with the Problems of Anthropology, the Zoological Position of Man, Extinct Species and Races of Man and their Culture, the Growth of Human Power, Origins of Civilization, Growth and Spread of Civilization, Man at the Present Day; it is a little difficult to follow his theme, or to find what he has to say that is new. He deals with various monkeys and their habits. He tells us ' Out of the ground-living or human group of animals which diverged from the arboreal apes, two species ultimately survived the rest. These were two species of man, the Neanderthal and the so-called ' modern ' species. Both had brains as large as the average European of to-day and larger than some modern savages. Both were " human " in their ways of living.'

EXTINCT FORMS.

' After long ages the more massive Neanderthal species became extinct; why, we do not know. Advancing along parallel lines the " modern " species evolved several races. Some of these have survived to the present day; others, inferior in no way that we can discover, have died out; why, we do not know. Even before the last ice age, when the Neanderthal species was still living side by side with the " modern " species, the products of human ingenuity witnessed to intelligence, artistic taste and manual dexterity, in no way inferior to those of modern races. Certain races developed a high culture; these races disappeared, leaving no descendants, and their culture was lost, not handed on, only to be rediscovered after the passage of roughly from fifty to a hundred thousand years. Once more, why they vanished and their culture was lost we do not know.'

A CONCLUSION.

The author's ' conclusion ' is somewhat inconclusive. He says, ' Man is himself altering the surface of the Globe with great rapidity. He seems bent on making a clean sweep of all

* ' A Short Study of the Human Species, Living and Extinct,' by H. G. F. Spurrell. London: G. Bell & Son. 192 pp. Price 7/6 net.

the larger animals, his mining and industrial activities are beginning to affect chemistry over wide areas of the earth, and his reckless destruction of forests is so disturbing the rainfall that deserts are appearing which spread like rodent ulcers as the dust raised from them by the wind chokes the surrounding vegetation. Appreciable interference with the course of nature one can see, but the ultimate effect none can foretell. And on this note we must close with what content we may: a note, not of pessimism, but of agnosticism. We know little of man's origin. He comes out of dim mists of uncertainty. The whole course of his existence up to to-day presents a long series of problems before which we stand baffled. And of his final destiny we dare not even guess.' With the exception of the last sentence, the author precisely expresses our feelings on having read the book. Yet the headings of his chapters led us to hope for something more definite.

LANCASHIRE AND CHESHIRE ENTOMOLOGISTS.

At a recent meeting of the Lancashire and Cheshire Entomological Society, Mr. S. P. Doudney showed a specimen of *Bapta taminata*, taken in Eggerslack Wood, Grange, being the first Lancashire record for many years. Mr. J. W. Griffin brought the results of his work from the Wallasey district during the summer; the exhibit comprised some 70 species, many of them in bred series, the most interesting being a specimen of *Sphinx convolvuli*, *Cerura furcula*, *Notodonta dictæa*, *Dasychira fascelina*, *Bombyx rubi* (a fine bred series), *Acronycta leporina* and a series of *A. megacephala* containing some fine dark examples; he reported that the larva of this moth has been very common in some of the Lancashire towns this summer; *Agrotis ripæ* (three specimens)—this has never before been reported from Wallasey; a single specimen of *Cleoceris viminalis*, also a new record for Wallasey; *Plusia festucæ*, *Mesotype virgata* and *Nyssia zonaria*, both the last had been commoner on the Cheshire sand-hills than for many years past. Mr. W. A. Tyerman also had a nice series of *M. virgata* and *N. zonaria*, a very pretty variety of *Chrysophanus phlæas* from Woolton, near Liverpool, which had the red marginal band of the hind-wings broken up into narrow red streaks; a male *Bryophila perla* with strong rosy ground colour from Cronton, and a fine banded form of *Carsia paludata* from Simonswood. Mr. W. Mansbridge exhibited bred series of *Larentia salicata*, *Coremia unidentaria*, both red and black-banded forms, and *Numeria pulveraria*, second brood, from Witherslack; a varied series of *Thera obeliacata* from Silverdale; also a number of species of Lepidoptera from Delamere Forest, which included a nice intermediate variety of *Amphidasys betularia* and a fine lot of *Retinia buoliana* from the young pine plantations in the forest where they appeared to be doing much damage to the young trees.

FROM THE BEECH WOODS.*

South Cave, Sept. 23rd.

Under the shafted beech trees tall and straight,
Looking down on the rifted chalk below,
With its deep, far shadows and golden glow,
Like a ' promised land ' to the eager sight,
Village and wood are asleep in the light,
And fair as a dream in September's flow—
No light leaves are dancing, no winds ablow,
Where the Humber sleeps in the Autumn bright,
Peace, perfect peace ! where the stubble-fields rest,
Where the green lanes stretch, with their hedges dark,
But lit by the flame of the hips and haws,
And sweet with the strength of the ploughed earth's breast,
Where the sod is rent by the chalk's white mark,
And gay are the hues of the earth's repose.

September 24th. E. LAMPLOUGH.

THE WRITING ON THE TREE.

Salix caprea, Nov. 25th.

The sere-leaf sallow at my gate
Is all in silken bud ;
And Hope says, if we only wait !
All shall be understood.
But what the Message ? Who shall say't
Save that it must be good.

Reflect !—How wonderful the birth
Of each new day upon the earth,
How dignate Nature's mien !
How briefly black, nor longtime red,
Quick-hiding all her parts of dead
'Neath lightsome, living green !

The dear All Mother feels to breathe
Her secret—Naught is lost, beneath
The shroud or eke the shell :
Look ! ' Palm '-buds on the withy's whip
Grow big with life through all the drip
Of cloud or icicle ;
So rathe or late comes Easter Day
Ready to wave that tassell'd spray
For Moth and Man—a Spell.

F. ARNOLD LEES.

* From the Hull Literary Club Magazine, Vol. V., pt. 1, p. 32.

THE COLONIST-ALIEN HERON-BILLS OF YORKSHIRE.

F. ARNOLD LEES, M.R.C.S. Eng., etc.

THE contrastive word-pictures, and sub-specific differentiations that follow, may be a help, and so have a more than merely temporary interest for West York herbarium factors; until that much needed revision of our waste-land Erodiums, understood to be in the hands of Mr. Edmund G. Baker, is forthcoming. Compiled from many book sources in collation with the growing plants, while arranging my own gatherings of the last ten years from the grey, limy fimites, *i.e.*, fleece scour and hide scrapings dumped in the curtilages of our felmongeries and tanneries, to be later spread as a valuable manure over both arable and pasture land, they represent the growths of such wide-apart areas as the Argentine, Africa (South), Egypt, the near East of Persian territory, with—and perhaps mainly, though not so exclusively as formerly—Australasia. Constantly re-inforced as wool-caught seeds, outcast with the scourings, they, with *Brassica elongata*, *Malva crispa* and *verticillata*, *Datura Tatula*, Medick- and *Xanthium*-burrs in variety, with a host of strange-faced Docks, " Fatheans " (Chenopods) twist-awn'd grasses like *Polypogon* and *Deyeuxia* and at least three sorts of *Amaranthus*, not only come up on the undistributed waste-heaps the first year of depositing, but cradled and hot-bedded thus accidently, in rich warm nitrogenous matrix, when the manure is dispersed over the tilth to germinate, flower, and ripen seed—not all of them, but many, the Malvas, Medicagos, and Erodiums especially—in a word, acclimatise and colonise; take their annual place as reinforcements of weed recruits in our crops. Our annual mean temperature, or our summer heat is not high and prolonged enough for many tropical peregrines of course; but the very curious 'Storks'-bills' are much in evidence, with their beaked fruits drying, through spiral shrinkage, until they give us a marvellous simulacrum of the Scythe of old Time fixed upon the Harry Lauder walking-stick of modernity! When dead and dry on the herbarium sheet, a touch of the warm moist finger and they make a move! even then, as if about to come alive again; no doubt, if planted under a bell glass many of them would, at almost any time.

For the following diagnoses I do not claim absolute identity to the plant of the author first describing them. I mean that I refer them to the group of growths under the name I give, for some are normally biennial where they occur natively, while only annual under the particular conditions they thrive in, here. And, probably also, one of the growths—the 'Musky

1917 Dec. 1.

Erodium' is not type 'moschatum' of L'Héritier, but either an undescribed 'species,' or an inodorous grec of the perfume-glanded growth. I mention it—to be careful—as pseudo-moschatum provisionally, and with deference to those systematists who may have monographed the genus, but with whose work a country panel-surgeon can claim but slight acquaintance.

The numbers after the name refer to G. C. Druce's 'List of British Plants' (H. Frowde, Oxford, 1908—an invaluable 'First Aid' to the 'simplest') and to J. C. Loudon's useful though ancient Encyclopædia of Plants with its First Supplement (1841) and its close upon 10,000 neat, though little outline illustrations. Honore Ardoino's *Flore des Alpes Maritimes* (1879), and H. Correvon's *Flore de Poche Touriste* (1894), Clarence Bicknell's *Flora of Bordighera and San Remo* (1896), and two or three more recondite plant-catalogue Notes, have been consulted, including (of course) Druce's Hayward—*multum-in-parvo* and *almagest* in one, on its topic !—and the two Hookers (W. J. and J. D.) Student's Classics of the dates 1850 and 1884 for the British Islands.

ERODIUM L'Héritier.

(Gk. *herodios*, a heron).

[*E. maritimum* L'Hér. 493 Oxf. List.—Leaves radical, not segmented, ovate with irregular toothing; neat squat habit; petals minute or nil. Only once seen inland; it probably does not grow on the lands whence the animals imported, as pelts, feed].

E. malvacoides (L) Allioni, 491 O.L., as *malachoides* Willd. (Flo. Berolinensis).—Squat habit but larger and coarser than the preceding. Leaves oval in contour, cardiated or broadened at base, crenate irregular blunt toothing of the simple lobes. Stem hairy, branching. Petals bluish, the length of sepals. A rarer plant of the skin-yards, and only I fancy when the pelts are of Levantine origin. In 1872-5 I used to see it oftener on the Durham harbours' ballast-hills. Very common on the littoral of the Mediterranean.

E. laciniatum Willd.—Red-petalled Heron's-bill of Crete. Loudon's Ency., No. 9440, and 490 Oxf. List. Stature, six inches or so. Stem prostrate. Inferior leaves lobed, the upper pinnatifid with acute linear lobes (Ardoino). Beak of carpels (4-5 in the umbel), 4 to 6 centimetres. Flowers small, purplish, stipules and bracts ovate, scarious. Mediterranean coasts, Nice (Bertolini) and eastwards; but its range to-day must be much wider than this delimitation would indicate, and book descriptions vary a little. Perhaps one with *E. Botrys* Bert., to which neither London nor Druce give a number, although Ardoino defines their points of difference.

E. Botrys Bertolini, Ardoino, p. 83-4.—Not under that name in either Loudon, and not numbered in Oxf. List (unless littoreum Leman, 492, is an earlier name, Ardoino's diagnostic is: Inferior leaves lobed, superior bipinnatif, with the 'arêté' of carpels (bony 'bill' as we say) 9 to 10 cmm. *i.e.*, $3\frac{1}{2}$ inches or so! Flowers—April to May on the Riviera, Rocks of Cape Croisette and Mont de l'Euze—somewhat large purple. . The only presumably authentic specimen I have, 'Terrill deterinavit, Kew,' shows an eight inches to foot high plant of neat, strict habit; two stiff, hardly branching flowering stems from rootstock, with leaves of two types—the radical ones with 2 inch stalk, pinnatifid, bluntly lanceolate in outline, the segmentation rather deep, markedly decurrent of blade with rounded lobations, the stem leaves also ovate but with a stiff distinctive Burnet-Kex like lobation, regular narrow acute pinnæ. Lilac petals (? faded) twice length of acute, nerved, scarious-bordered sepals. Umbel with 3 to 5 reflexing pedicels. If this is Bertolini's Botrys, nothing in the physiognomy of the flower or fruit arrangement suggests the cluster of grapes its title implies. It is the next commonest to *E. cicutarium* on the scouring heaps of our skinyards. The awns or beaks of the fruit in this and the next are described as finely silky bearded.

E. littoreum (Léman) D.C., 492 Oxf. List; 9454 Loudon.—A small diffuse caulescent perennial after the style of *E. maritimum*, smoothish, with cordate leaves, with 3 rounded lobes unequally crenate. Petals reddish, awns of carpels bearded. I have not recognised this as yet upon our 'tips.' Another species of which I have no knowledge, placed next to this in Loudon is

E. serotinum Stev., No. 9455, Loudon, described as a late-flowering, more boreal plant (Siberia and Russia), perennial of 9 inches or so, single or many-stemmed, diffuse, leaves opposite, tri-lobed, with broad serrated segments, divaricating laterally, from the axils of which springs a shortish common peduncle, many-flowered, with broadish acute blue-petalled flowers, judging by the small cut on page 568 of the old Encyclopædia, in which, spite its out-of-dateness, novices at the name-game may get many an acrostic 'light.' The reference is given to Sweet's Geraniums, 137, a book I have not access to.

E. moschatum L'Hér. (Ger. m. (L) Allioni, 494, Oxf. list. As Asa Gray—of acute perceptive flair—put it, all the allied forms of this have the sepals without bristle points, and the filaments of the anther-bearing stamens with two teeth at their base. [Whilst all the cicutarium section reveal the exact opposite respectively]—little need to describe this in full detail, if the growing plant exhales a powerful musky scent. The

leaves are lanceolate in outline, pinnate with short stalklets, the segments rather irregularly incised and serrated, but not so deeply as in the hemlock-leaved stork's-bill. The bill of the carpels is variously given in books as from 3-5 centimetres (1 to nigh 2 inches) in length. Petals rosy lilac, or paler, not contiguous. Peduncle and pedicels downy-glandose; many flowered. It varies in hairiness and depression-angle of the lateral branches from root-crown. E.B.t. 902 is generally quoted as a satisfactory figure, and Babington's classic differentiation is a concentric furrow below a circular glandular depression on the carpel, stipules oval and more obvious than in *E. cicutarium*. In Rouy and Foucard's Flore de France, Vol. IV., p. 113, mention is made of a

Var. *minor*.—Very small, neat and early flowering (Apl.-May). Somerset growths mentioned by White (Fl. Bristol, 219), not exceeding 3 inches even when in fruit. Another form which defies exact reference, on our Yorkshire skin-yard (*not* flour mill or malt-kilning) heaps I would provisionally, and consciously temerarious, call

Var. *pseudo-moschatum*, that term expressing it well enough as I know it in the artificial " fed-up ' conditions under which it will grow from 1 to nearly 2 feet high. Vegetatively much larger, coarser, pubescent glandular, but without even a trace of musk or castor keenness to the nostril. The bracts and stipules are scarious, ovate cordate almost amplexicaul; the pinnate leaves with the leaflets nearer together, ampler in their lobation, and more crenately-dentate on the margin. The umbel is many flowered, crowded, but the petals are still non-contiguous ellipses of mostly a pale pinky lilac. Abortive energy ?—disease ? well! but the carpels ripen and oftener exceed 2 inches than fall short. The sepals, however, are not bristle-tipt, and the threads of the perfect stamens are ' ciliate ' (Ardoino's definition of *E. ciconium* W.) or, as Hooker puts it: ' toothed at the base.' I have many fine specimens, some of which have been shewn to Dr. F. N. Williams, at the service of any who wish to pursue the enquiry further.

E. ciconium (L) Allioni, No. 496, Oxf. List. No. 9441, Loudon,—placed between *E. laciniatum* and *E. cicutarium*, ' the long-beaked Stork's-bill. Stems ascending. A spithamal annual of S. Europe and the Levant. Leaves somewhat villous, pinnated with blunt pinnatifid-toothed segmentation (Loudon); large, bipinnatifid with decurrent lobes (Ardoino); threads of perfect stamens ciliate, and beak of fruit 6-8 centimetres long (quite 3 inches !). Petals as long as calyx, ' large, purplish ' (Ard.). Peduncles many flowered. I have been confusing this with *E. Botrys*, unless the two are conspecific. Loudon's reference is to Jacq. Vind 1, t.18. Both have notably prolonged beaks to the fruit, which, too, when dry, shows long white silky hairs.

E. cygnorum Nees, in Pl. Preiss, i., 162. Not in Loudon's Encyclo ; 499 Oxf. List.—Australia ; and (?) other parts of the S. hemisphere—one sees it on the heaps of waste, off skins from both the Argentine and the Cape. The source of the pelts fleshed in any particular yard has more than once helped me to a name ! F. Müeller's description, in Plantæ Victoriæ,i. 172 (1862)—to which Mr. G. C. Druce has helped me—follows. ' Annual or biennial, habit of the coarser forms of *E. cicutarium*, sometimes slightly pubescent, sometimes hispid with the hairs of the stem spreading or reflexed. Leaves deeply 3-lobed, or divided to the base into 3 lobes or segments, usually obovate or cuneate, and more or less deeply-toothed, or again 3-lobed, the central lobe larger, broader, and more lobate than the lateral ones. Flowers blue usually 2 to 5 in the umbel. Sepals pointed. Petals obovate, scarcely exceeding the calyx, or shorter. *Filaments of the anthers broad at the base with subulate points ; staminodia scale-like, often toothed.* [In examining the flowers of these Erodia with the lens, the distinction of which is ciliate or subulated, and which toothed must, clearly, be carefully ascertained, for in *E. moschatum* Hooker says the perfect, ' anther-bearing filaments are toothed at the base.'] Capsule lobes glabrous, or hairy, or hispid. ' Beak usually above 2 inches in length.' Three ! not infrequently, and relatively to others, truly Swans'-billed ! Recognised in Yorkshire by Dr. B. Carrington as long ago as 1861, about Guiseley and Yeadon Mills, and near Huddersfield in 1858, but in that case recorded as giant ' moschatum ' ; which leads us ' back to our muttons ' (fleece borne, imported, if unimportant, vegetal waifs and strays). That *E. moschatum* was looked on as a Foreigner (by some) is shown, I think, by its earlier name of the Muscovy Herons'-bill. The garden-grown musk-geranium was known to Ray in 1670 (Cat. 132), and not only for ' near Bristow ' but for the limestone stone-wall country of Craven in Yorkshire, where it was probably entitled even more justly to the rank of an intruder from foreign parts, brought in some way with raw material to the first industrial works, as now with much multiplied frequency to the latest. There is no specimen of the time extant I believe to settle which the Cravener really was ; and even coming down to the Hailstone period of 1792, 125 years back only, there is no Craven specimen in the York Museum Herbarium, the Catalogue of which, so ' truly and laboriously laid ' and made for us by Mr. Hy. J. Wilkinson, present Honorary Curator, lies before me, with its (in other cases) hundreds of invaluable fixed data. And, indeed, the truly musk-scented growth is, to-day, incole or casual, almost the rarest and most exceptional of those compensational growths which, like the Pineapple mayweed, are taking the place of an older flora,

ground-ivy or speedwell, by our field banks and hawthorn hedgesides. About Leeds, *Yellow beadstraw* and *Convolvulus arvensis* have almost vanished—trampled out of existence by the footpadding of the *oi polloi* ; and I know many a roadside bank on the Roman ' rigg ' of Allwoodly and Moortown, gay when I was a lad, more than half a century ago, with such common offertories of nature as *Viola Riviniana* and *Fragariastrum*, sterile and non-posyworth as they might be, along which, five miles in ' the country ' outside Borough boundaries, hardly a single tuft could be found in the height of next year's printemps ! So it is I conclude—reverting to the ' occurrence ' of the ' muscovy ' geranium in Craven 250 years ago—that as all plants were ' First-foots ' once, ' in a Beginning ' as Genesis has it—on the thresholds of earth in our land, where men from Turner's day found and made record of them, at best *E. moschatum* must rank as one of those many colonists that have not under the conditions ' made good,' because either the initial material was too scanty, or reinforcements to sustain the effort too irregular. It needs quantity and a ' big push ' often to make some colonists permanent incoles ; a century didn't do it with the *Roemeria* poppy in Cambridgeshire cornfields, and with cleaner and cleaner seed-corn the Hares'-ear Grow-Through, once frequent has grown—rather *not* grown—to be the rarest of ' Kecksies ' over our warm acres of magnesium-limestone arable.

[*E. hymenodes* Willd. 9447, Loudon ; 498, Oxf. List.—N. African Mediterranean coasts from Barbary east to (?) Egypt. A spithama (9 inches) in stature with petals pinky blue, shrubby at base, a stove perennial, *i.e.*, tender (Loudon), stem erect, branching, leaves tri-lobed or five partite, very blunt, crenate, stipules and bracts ovate, scarious. I do not know it on our skin-yard fimits for certain, hot-bed like as they are under summer sun for 3 months, during which a *Datura Tatula* with livid blue stem a yard high, will form its prickly chestnut-burr fruits ; but Dunn admits it as having occurred].

E. cicutarium L'Hér. ' Hemlock ' lvd., Stork's-bill, 497, Oxf. List.—Well-known in two forms as a native in sandy soils both coastal and inland, all forms having bristle-tipt sepals, with the filaments *not* toothing. Leaves pinnatisect with linear sessile segmentation, pinnatifid, or even further decompound like *Conium* or *Anthriscus*, the var. or form *chærophyllum* Cavan., possibly the type, commonest at any rate among those of suspect sites which have been manured from skin-waste.

Forma *chæophyllum* Cav., 497 e., Oxf. List.—Hooker says the pinnules are acute lobed, and petals twice as long as the non-glandulose sepals which have appressed hairs.

F. bipinnatum Willd., No. 9442b. Loudon, who says it is

Numidian, and puts it as a tender ' stove ' annual, caulescent, diffuse, six inches high, purple petalled, and leaf segments with linear lobes. Con-varietal with the last, or one of the other hairy evolutions, but Loudon's reference is to Cavanillies Disserts, vol. 5 t. 126 (1803).

F. pimpinellæfolium Sibthorp, 497b., Oxf. List.—The form in which two of the petals have a deeper coloured spot at their base. Our W. York limites show this occasionally, but I am unable to correlate the stigmation with any other constant character unless it be an arrest in the expansion, and so the size of the petals, but I never saw it in the *chærophyllum*—well developed ?—growths.

F. micranthum Beck, 497d.—Sounds small-flowered—an exhaustion of energy, from poor matrix plus untimely climatic pinch ? But I do not know it on the ' field ' I have worked.

Many growths would answer well to the *pilosum* Lej. and Court, and more still to the *pallidiflorum* Jordan, the vars. c. and f. of Druce's Oxford List, but their titles do not convince me that they can be much more than states, but *F. glandulosum* Bosch, No. 497g. of his list would seem to rank differently if the production of glands implies more than temperatural energy. Druce defines it in Hayward's Bot. Pkt. Book, 46-7—a most useful ' lug-about '—as small, three to twelve inches, biennial (lasting through a winter) and densely glanular In our W. York. ambits, where the conditions vary little, one season merely a week or two earlier or later than than preceding, this glandose form grows ecadically among the others not rare but accidental.

E. romanum Willd., 495 Oxf. List ; 9443, Loudon.—Differs from the last in that the leaves are all radical, as is the common peduncle of the inflorescence. Flowers larger, petals purple, equal sized. C. Bicknell says ' perennial.' Normally about half-a-foot, nearly stemless, leaves pinnate with ovate pinnatifid lobes ; Loudon gives a variety ' *caucalifolium* Sweet ' as merely ' of larger size,' and abroad I have seen it producing a more or less leafed branching stem from ' fed-up ' robustious crowns, as occasionally *Cnicus arvensis*, the stemless thistle, or *Primula vulgaris* do, from either pollen-smirch or just excess of energy. These sports are not worthy of the title variety, *me judice*, as they don't repeat from self-sown seed. I think, too, that a good deal of cross-fertilisation takes place where two or more sorts of this genus grow together in the artificial conditions of a mobilised industrial supply.

There remain to be considered only two subalpine Mediterranean forms, now and then seen in rock-gardens, and in delph-tips where rubbish has been dumped.

[*E. petræum* Willd. (Correvon), 9436, Loudon.—Small Rock H.-bill ; E. Pyrenees, eastwards. Stemless, root-stock

woody and branched somewhat like *Hippocrepis*, being perennial, leaves smoothish pinnated with straight lobations, velutinal and glandose and so having a ' ram ' or goaty smell. Umbels 2-6-flowered, petals largish, conspicuous being bright rose, paler veined, or nearly white, with purple veining as in *Geranium laucastriense*. Not seen on the skin-yard tips].

E. Manescavi Boub. (Correvon, p. 38).—From Basses-Pyrénées. Rootstock carrot-like, from which spring pubescent pinnate serrati-lobed leaves like a glorified *E. moschatum*. Flower-stems erect, in umbel of 10 or more pedicilled, largish, rosy-petalled flowers. Found semi-naturalised in a south-facing neglected quarry hole at Roundhay, conveyed there with raking from a fine garden, not, I fancy, deliberately introduced as *Geranium Endressi* was at Woodsome near Huddersfield, and the West Meanwoodside grounds of the late lamented traveller, Oates, who lost his life in the Antarctic. In the same demesne planned and planted quite 60 to 80 years ago by his sires, *Potentilla canadensis*, *Rubus spectabilis*, *Cornus mascula*, *Amelanchier*, *G. Shallon* and many another interesting Stranger, are abundantly naturalised, making the demesne with its rare preserved Natives now long gone from elsewhere near Leeds, a veritable Botanists' Eden.

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FIELD NOTE.

Analysis of Water from Manvers Main Colliery, Wath, near Rotherham.—This water was taken at a depth of 400 yards from the surface. It had a temperature of 73° Fahr., and a specific gravity of 1·085 :—

	Grains per gallon.	Grammes per litre.
Calcium sulphate	168·74	2·411
Strontium sulphate	trace.	trace
Calcium carbonate	3·53	·050
Sodium chloride	6207·70	88·681
Lithium chloride	trace	trace
Calcium chloride	1366·55	19·522
Magnesium chloride	551·55	7·879
Ammonium chloride	12·22	·175
Magnesium bromide	50·30	·718
Alumina and ferric oxide	1·75	·025
Silica	1·40	·020
	8363·74	119·481

JOHN HY. PAYNE, F.I.C.

Naturalist,

OLD NATURAL HISTORY MAGAZINES, ETC.

T. SHEPPARD, M.Sc., F.G.S.

(*Continued from page 356*).

THE MALACOLOGICAL AND CONCHOLOGICAL MAGAZINE.

Conducted by G. B. Sowerby, F.L.S., etc., etc. Part I., London: Printed . . . for G. B. Sowerby, Great Russell Street, Bloomsbury, 1838. For private, gratuitous distribution only' is the title of an octavo publication, a copy of the first part of which I now have. It was 'to be continued monthly,' but the British Museum Catalogue only notes two parts, in 1838 and in 1839.

On the first page we learn that 'This work is intended as the Conductor's gratuitous contribution for the advancement of one of his favourite branches of Natural Science. The particular object which he proposes to himself in commencing it is the establishment of a Malacological and Conchological Society in London, it will be carried on at the sole expense of the Conductor for a twelvemonth, by which time it is to be hoped such a Society will be established; when it will be naturally replaced by their transactions. The Conductor will admit useful original articles relative to Malacological and Conchological Science in all their branches, and he invites articles relating to those sciences in their connection with Geology.'

This part contains 32 pages and a plate, followed by 8 pages of specimen plates, etc. One of these is devoted to 'The Yorkshire Meteorite' which fell at Thwing in 1795. The Meteorite was then in the possession of the Sowerby family, who were prepared to deliver it to the Trustees of the British Museum 'as soon as £300 shall be subscribed'!

THE ZOOLOGICAL MAGAZINE.

or Journal of Natural History, being a series of Miscellaneous Articles, original and translated, on interesting subjects in Zoology, illustrated by engravings in steel and on wood.'

This publication appeared in 1833, six parts (8vo) with a total of 192 pages, were published, and the last part has an index occupying less than a page. The articles refer to the Giraffe, Rhinoceros, Elephant, Polar Bear, etc., and occasionally there are shorter notes of zoological interest.

My copy, recently obtained, was once in the possession of Richard Owen, and bears his signature.

MOSLEY'S HISTORY OF BRITISH BIRDS.

(See pages 146-7 of Yorkshire's Contribution to Science). I learn from *British Birds*, August, 1916, p. 71, that Mr.

Mosley's work of 69 numbers appeared in 59 parts, and the work was issued in two editions, 'superior' and 'ordinary.'

SOCIETY OF AMATEUR GEOLOGISTS.

In 1888, was published Vol. I., No. 1 of an octavo publication, the first number of which contained 12 pages which were entirely devoted to the presidential address by W. Semmons on 'The Metallic Ores of Cornwall.' In the same year, Vol. I., No. 2 was published, but the heading now appears 'Proceedings of the Society of Amateur Geologists' and it bears the name W. J. Atkinson, Hon. Sec. It contained abstracts of papers by J. L. Lobley, A. H. Williams and G. A. J. Cole. It was paged from 13 to 20. In the same year No. 3 appeared, containing abstracts of papers by G. F. Harris, W. J. L. Abbott, Prof. G. S. Boulger, W. C. Ross and J. T. Day (pages 21 to 40). In 1889 appeared No. 4, with papers by W. Smart, J. Slade, J. T. Day, Prof. Boulger, W. J. Atkinson and H. Fleck (pages 41 to 68). No 5 contains pages 69 to 84, with abstracts of papers by T. Leighton, R. McAllan and Prof. Boulger. It was published in 1890. With this part was issued a title page, list of officers, preface, and contents. From the preface we learn that the Society was then joining with the Metropolitan Scientific Association, and consequently no further publications were issued. The five parts were printed at Lewes.

RECORDS OF MINING.

In 1829 was published part 1 * (and last) of 'Records of Mining,' edited by John Taylor, London, John Murray, 4to, 174 pp. The work was hoped to 'supply a want in our national literature.' It contains seven papers, five by J. Taylor, and two by J. H. Vivian. These principally refer to Cornwall, etc. There are also 'tables exhibiting the quantities of Copper, Tin, Lead, etc., produced in Great Britain.' The last refer to Yorkshire and other northern counties.

'THE MINERALOGICAL MAGAZINE.

and the Journal of the Mineralogical Society.'

The Mineralogical Society was instituted on February 5rd, 1876, and from its bye-laws we learn that 'The object of the Mineralogical Society of Great Britain and Ireland, with which the Crystallological Society was amalgamated on December 11th, 1883, shall be to advance the knowledge of Mineralogy, and also of Crystallography and Petrology.' The Society has

* In a 'Biographical Notice of the late John Taylor, Esq,' (*Phil. Mag.*, Vol. XXVI., 1863, p. 73, it is stated 'His "Records of Mining" . . . was entitled Part 1, and Mr. Taylor hoped that a sufficient interest existed in mining and the allied subjects to support it; but no second Part appeared.'

issued a Magazine, octavo, which averages about 100 pages each part, with plates. The last part is published is No. 84 (Vol. XVIII.), June, 1917. The first appeared in 1876. In recent years two parts have appeared annually. The Magazine has been edited by Mr. L. J. Spencer, M.A., since 1901.

The Magazine contains scientific papers that have been read before the Society; these give the results of original work that have not been previously published elsewhere.

At the end of each volume (since Vol. XI., 1897), the Editor has given a 'List of New Mineral Names.'

THE QUARRY.

This paper is the 'Organ of the building, road stone, stone, marble, slate, and all mineral industries,' and is issued at the *Colliery Guardian* Office. It is sold at 6d. monthly, the number for December, 1916, being Vol. XXI., No. 252. It averages 24 pages of letter press, in double columns, and frequently contains notes relating to northern quarries, etc. The publication measures 11″ by $8\frac{1}{4}$″, and is well illustrated.

ARCHÆOLOGICAL REVIEW.

In March, 1888, appeared part 1 of the Archæological Review, a Journal of historic antiquities, which was sold at 12s. 6d. net, was royal octavo in size, and each monthly part (2s. 6d.) contained a supplement of four or more pages entitled 'Index of Archæological papers.' It was published by David Nutt, London. Volume I. contained the parts March to August with a total of 456 pages. Volume II., September, 1888, to February, 1889, contained 413 pages. Volume III., March to July, 1889, contained 435 pages, and Volume IV., August, 1889 to January, 1890, contained 477+79 pages.

(In Vol. IV., pp. 446-7, it is stated that the *Archæological Review* will in future appear as the official organ of the Folk-lore Society, and under a new name).

THE JOURNAL OF THE POSTAL MICROSCOPICAL SOCIETY.

A Miscellany of Natural and Microscopical Science.*

With this title, four quarterly parts (8vo) were published in Volume I., in 1882, 206+17 pp, under the editorship of Alfred Allen. In Vol. II. (1883, 264 pp.), parts 7 and 8 were issued together 'so as to complete the volume at the close of the year of the Postal Microscopical Society.'

With Volume III., the title was altered to

THE JOURNAL OF MICROSCOPY AND NATURAL SCIENCE: THE JOURNAL OF THE PORTAL MICROSCOPICAL SOCIETY.

It contained the four quarterly parts for 1884 (271 pp.), and was still edited by A. Allen.

* See 'Yorkshire's Contribution to Science,' p. 150.

Volume IV. contained 296 pp.

Apparently this journal continued till Vol. IX., when it was merged in the *Weekly Naturalist* and became *The International Journal of Microscopy and Natural Science.**

In the Preface to this Volume, the announcement is made that in January, 1886, "will appear a publication with the title, *The Scientific Enquirer.*"

THE SCIENTIFIC ENQUIRER.

In February, 1886, appeared the first part of 'The Scientific Enquirer, a monthly medium for the supply of information on all Scientific Subjects,' edited by Alfred Allen, 8vo., 20 pp., and with the December issue the first volume was completed, with a total of 238 pages, including index. There were short contributions on general natural history subjects,† but much of this journal was taken up by queries and answers. It was printed at Bath, and issued from 1 Cambridge Place, Bath, the editor's address.

At the close of Volume II.,‡ for 1887, the editor apparently announced his intention of discontinuing the journal, as in January, 1888, he refers to this, but agrees to continue as a result of very kind offers received. Twelve parts appeared during 1888, forming Volume III. (224 pages, including index). At the back of the title-page, however, appears the following note: 'To our Readers,—We have endeavoured, during the past year, to fulfil our promise further to improve "The Scientific Enquirer," but the amount of labour entailed is more than we feel justified in imposing upon ourselves and friends. With this number we bring those labours to a close, and in bidding farewell to the 'Scientific Enquirer,' express the hope of addressing many of our readers through 'The Journal of Microscopy,' in which we hope to introduce some of the features which have distinguished the "Enquirer."'

THE UNION JACK NATURALIST.

I was previously unaware that the 'Union Jack Field Club' did more than circulate manuscripts among its members,§ but apparently five parts of a magazine at least, were published, four of which I have recently obtained, each being sold at one penny. The first (Vol. I., No. 1) bears the title 'The Union Jack Naturalist, Journal of the Union Jack Field Club and Naturalists' monthly Intelligencer.' It was issued in October, 1881, 8vo, 'edited by C. E. Kennedy, M.U.J.F.C.', who

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* See *loc. cit.*, pp. 150-1.

† There is a note (page 108) on the Mosses from the Prehistoric Boat at Brigg, Lincs.

‡ So far I have not obtained the second volume.

§ See 'Yorkshire's Contribution to Science,' p. 22.

also published it at ' Liscard Park, Birkenhead.' It contained 8 pages and cover; No. 2, 12 pages, without cover, dated December, 1881, was entitled ' The Union Jack Naturalist, a monthly magazine of Natural History.' I have not No. 3, issued in January, but No. 4, dated February, 1882, has the words ' Journal of the Union Jack Field Club ' added to the last-named title, and the publisher's name ' W. P. Collins, London,' added. Possibly others were issued. In July, 1882, was published ' Vol. 2, No. 1' entitled ' The Union Jack Naturalist, a monthly magazine of Natural History, with which is incorporated ' The Boys' Naturalist ' [apparently still another publication !] New Series, conducted by C. E. Kennedy. It is issued with a cover; there are 11 pages of matter and 4 pages of advertisements. Among the contributors we notice R. Christie, J. E. Robson, S. L. Mosley, S. A. Alexander, W. Irving, W. H. Bath, O. V. Alpin, H. S. Ward, Clara King, Ford and G. O. Howell. There are also several reports of meetings of societies which are mostly now, alas, extinct.

More information respecting these and other similar journals would be gladly received.

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BIRDS.

Pied Wagtails, etc., on Migration.—Referring to the notes on the Pied Wagtail in the October number of *The Naturalist* (page 360) by Mr. Fortune, I may state in coming from Eldwick to Wilsden in September, 1916, I saw an immense number of birds, evidently on migration, chiefly Pied Wagtails, but associated with this species, were a few Ray's Wagtails, Meadow Pipits, and one or two other species in limited numbers, but what is still of more importance, the Pied Wagtail, which almost always leaves this district in winter to a bird, remained last winter, severe as it was, in some numbers, just as it did in the severe winter of 1879-80.—E. P. BUTTERFIELD.

Breeding of the Long-tailed Tit in Airedale.—Adverting to Mr. Booth's note on the nesting of this species in Upper Wharfedale, the Long-tailed Tit is not a common breeding species in Airedale, but I saw it in the breeding season about Beckfoot, near Bingley. about two years ago, and I think within recent years it will also have bred in Nab Wood. One bred here in a holly bush many years ago. I have also found it breeding in North Yorkshire, where I have good reasons for thinking it may breed more commonly than in Airedale. A gamekeeper within recent years brought me one which he had shot and wanted to know whether it was a *little owl* ! I think it is commoner here in winter than in summer.—E. P. BUTTERFIELD.

SPHAGNA.

WM. INGHAM, B.A.,
York.

(*Continued from page 352*).

Sphagnum fuscum v. Klinggr. Not common.
var. *medium*, f. *heterocladum* W. (Cronkley Fell) Jones and Horrel.
S. Warnstorfii Russ. Not common.
var. *versicolor* Russ. (Cronkley Fell) Jones and Horrell.
S. rubellum Wils. Common.
var. *viride* W. (Cronkley Fell and pastures) Jones and Horrell.
var. *flavum* Jens. ap. W. (Saltersgate Beck and Eller Beck.)
f. *pallescens* W. (Cronkley Fell and Mickle Fell) Jones and Horrell, and (Leckby Carr).
var. *rubescens* W. (Cronkley pastures) Jones and Horrell, (Cronkley Fell and Eller Beck).
var. *violascens* W. (Fen Bog.)
var. *purpurascens* Russ.(Cronkley Fell and Mickle Fell) Jones and Horrell.
var. *versicolor* W. (Mickle Fell) Jones and Horrell, (N.E. Yorks.) Wheldon, (Cronkley Fell).
S. acutifolium Ehrh. Common.
var. *viride* W., f. *drepanocladum* W. (Strensall Common).
f. *heterocladum* W. (Cronkley Fell and Mickle Fell) Jones and Horrell, (Wheeldale and Pilmoor).
f. *orthocladum* W. (Wheeldale.)
var. *pallescens* W. (Cronkley Fell) Jones and Horrell.
var. *roseum* W. (N.W. Yorks.) Wheldon.
var. *rubrum* Brid., f. *drepanocladum* W. (N.E. Yorks.) Wheldon ; f. *heterocladum* W. (N.W. Yorks.) Wheldon.
var. *versicolor* W. (Cronkley Fell and pastures, and Mickle Fell) Jones and Horrell ; (Baugh Fell and Arkengarthdale).
f. *venustum* Wheld. (Shaklesboro' Bog.)
f. *deflexum* W. (Strensall Common.)
f. *densum* Wheld. (Reeth and Shaklesboro' Bog.)
var. *flavo-rubellum* W. (Cronkley Fell and pastures) Jones and Horrell ; (Goathland, Cronkley Fell and Fen Bog).
var. *flavescens* W. (Mickle Fell) Jones and Horrell ; (Dent, Farngill and Fen Bog).
var. *obscurum* W. (Cronkley pastures) Jones and Horrell.
S. quinquefarium W. Not common.
var. *viride* W. (Cronkley Fell and pastures, and Mickle Fell) Jones and Horrell.

f. *drepanocladum* W. (Wheeldale.)
f. *heterocladum* W. (Beedale and Wheeldale.)
f. *brachyanocladum* W. (Wheeldale.)
var. *flavum* W., f. *heterocladum* W. (White Force.)
var. *pallens* W. (Cronkley Fell and pastures, and Mickle Fell) Jones and Horrell.
var. *roseum* W. (Cronkley pastures) Jones and Horrell.
S. plumulosum Roll. Very common.
var. *viride* W. (Cronkley Fell and pastures, and Mickle Fell) Jones and Horrell.
f. *laxum* W. (Hackness, Skipwith Common, Strensall Common and Guy's Cliff.)
f. *squarrosulum* W. (Arncliffe Wood.)
f. *griseum* W. (N.E. Yorks.) Horrell; (S.W. Yorks.) Crossland.
f. *laete-virens* W., var. *læte-virens* Braithw. (N.E. Yorks.) Wheldon; (Buttercrambe Woods).
var. *pallens* W. (Cronkley Fell and pastures, and Mickle Fell) Jones and Horrell, (Brimham Rocks).
f. *laxifolium* W. (Eller Beck.)
f. *substrictum* W. (Fen Bog.)
f. *pungens* Wheld. (Osmotherley.)
var. *coerulescens* Schlieph. (N.W. Yorks.) Wheldon, (Saltersgate Beck).
var. *lilacinum* Spruce in Herb. Stabler. (Cronkley Fell) Jones and Horrell, (Saltersgate Beck).
f. *orthocladum* W. (Goathland.)
var. *purpureum* W. (Cronkley Fell and pastures) Jones and Horrell, (Wheeldale).
f. *robustum* W. (Wheeldale.)
f. *gracile* W. (N.W. Yorks.) Wheldon.
var. *versicolor* W. (Cronkley Fell and pastures, and Mickle Fell) Jones and Horrell, (Fen Bog).
f. *validum* W. (Saltersgate Beck.)
f. *tenellum* W. (Black Hambleton.)
f. *ascendens* W. (Wheeldale.)
var. *flavofuscescens* W. (Cronkley Fell and pastures) Jones and Horrell; (Strensall Common, Skipwith Common in abundant fruit, and Eller Beck).
var. *ochraceum* W. (Cronkley Fell and pastures) Jones and Horrell; (White Force in fruit, and Cronkley pastures).
f. *Schillerianum* W. (Scarth Nick, Osmotherley.)
S. molle Sull., var. *molluscoides* W. Not common.
f. *heterophyllum* W. (Falling Foss.)
f. *tenerum.* (Wheeldale.)
f. *squarrosulum* W. (Eller Beck.)

S. compactum DC. Common.
var. *subsquarrosum* W. f. *strictum* W. (E. Yorks.) Wheldon.
f. *densum* W. (E. Yorks.) Wheldon; (Skipwith Com.).
f. *divaricatum* W. (Barmby Moor.)
var. *imbricatum* W. (Cronkley Fell) Jones and Horrell; (Hackness).
f. *purpurascens* W. (Saltersgate Beck.)
f. *flavescens* Wheld. (N.W. Yorks.) Wheldon; (Eller Beck).
var. *isophylla* Wheld. (Sandburn Wood.)
S. squarrosum Pers.
var. *spectabile* Russ. (Cronkley pastures and Mickle Fell) Jones and Horrell.
f. *densum* W. (N.E., N.W. and Mid. W. Yorks.) Wheldon.
f. *elegans* W. (Buckden Pike.)
f. *patulum* W. (E. Yorks.) Wheldon, (Buttercrambe Wood) Bellerby, (Arncliffe Wood).
var. *subsquarrosum* Russ. ap. W. (Mickle Fell) Jones and Horrell.
f. *elegans* Russ. (Halifax) Crump.
f. *gracile* Russ. (Askham Bog.)
f. *cuspidatum* W. (N.W. Yorks.) Jones and Horrell.
var. *imbricatum* Schimp. (S.W. Yorks.) Akroyd.
S. teres Angstr. Not common.
var. *imbricatum* W. (Cronkley Fell and pastures, and Mickle Fell) Jones and Horrell.
f. *gracile* W. (Cronkley pastures) Jones and Horrell, (Eller Beck).
var. *subteres* Lindb. (Mickle Fell and Cronkley pastures) Jones and Horrell.
S. amblyphyllum Russ. (S.W. Yorks.) Armitage.
var. *mesophyllum* W., f. *silvaticum* Russ. (Wheeldale and Brimham Rocks.)
f. *molle* Russ. (Fen Bog,)
var. *parvifolium* W. (*S. brevifolium* Roll.)
f. *capitatum* W. (Baugh Fell.)
f. *brachycladum* W. (Wheeldale.)
f. *Warnstorfii* W. (Eller Beck.)
f. *Inghami* Wheld. (Eller Beck.)
S. pulchrum W., var. *fuscoflavens* W.
f. *brachyhomalocladum* W. (Ravenscar.)
S. recurvum P. de Beauv. Very common.
var. *majus* Angstr.
f. *silvaticum* Russ. (N.W. Yorks.) Wheldon; (Arncliffe Wood, Wheeldale, Saltersgate Beck, Scarth Nick).
f. *deflexum* W. (N.E. Yorks.)Wheldon.
f. *hydrophyllum* W. (Arncliffe Wood and Saltersgate Beck.)

var. *parvulum* W., f. *viride* W. (Hebden Bridge) Needham; (Arncliffe Wood, Fen Bog, Goathland Moor).
f. *pallens* W. (Hurstmoor, Reeth.)
f. *flavescens* W. (Eller Beck.)
S. serratum Aust., var. *serrulatum* W. (Halifax) Crossland.
S. cuspidatum Ehrh. Very common.
var. *falcatum* Russ., f. *molle* W. (Ravenscar.)
f. *pungens* Grav. (Barmby Moor.)
f. *gracile* W. (N.E. Yorks.) Wheldon, (Skipwith Com.).
var. *submersum* Schimp. (Roulston Scar.)
f. *crispatum* W. (Raincliffe Moor.)
f. *rigescens* W. (N.E. Yorks.) Wheldon.
sub-f. *robustum* W. (Skipwith Common.)
sub-f. *subtilis* W. (Skipwith Common.)
var. *plumosum* Schimp.
f. *remotum* W. (Staintondale) Bellerby.
f. *densum* W. (E. and N.W. Yorks.) Wheldon.
var. *plumulosum* Schimp. (S.W. Yorks.) Crossland.
S. molluscum Bruch. Common.
var. *vulgatum* W.
f. *robustum* W. (Ravenscar.)
f. *compactum* W. (E. and N.E. Yorks.) Wheldon; (N.W. Yorks.) Barnes; (Black Hambleton, Goathland, and Shaklesboro' Bog).
S. obesum W. (N.E. Yorks.) Spruce, (Strensall Common) Webster.
var. *luxurians* W. (S.W. Yorks.) Wheldon.
var. *hemiisophyllum* W. (Greenfield) Watson.
S. subsecundum Nees. Rare (Strensall and Skipwith Commons).
var. *tenellum* W., f. *subfalcatum* W. (Barmby Moor.)
var. *intermedium* W. (Mid. N. Yorks.) Wils. and Wheldon.
var. *lanceolatum* W., f. *humilis* W. (N.E. Yorks.) Wheld. and Massee.
S. inundatum R. et W. (Cronkley Fell) Jones and Horrell.
var. *ovalifolium* W., f. *brachycladum* W. (Fen Bog and White Force.)
f. *robustum* W. (Strensall Common and Eller Beck.)
f. *subfalcatum* W. (Pilmoor and Sandburn Wood.)
var. *lancifolium* W., f. *submersum* W. (Strensall Common.)
S. auriculatum Schimp. Not common.
var. *ovatum* W., f. *intortum* W. (Goathland and Ravenscar.)
f. *pallidoflavum* W. (Falling Foss.)
var. *laxifolium* W. (Fen Bog.)
var. *cano-virescens* W. (Taith's Gill, Baugh Fell.)
S. aquatile W.
var, *mastigocladum* W. (Goathland Moor) Bellerby.
S. contortum Schultz. Rare.
var. *gracile* W., f. *teretiramosum* W. (Skipwith Common.)

S. crassicladum W. Fairly common.
var. *magnifolium* W., f. *fluctuans* W. (Skipwith Common.)
f. *plumosum* W. (Staintondale) Bellerby, (Skipwith Common).
f. *lonchocladum* W. (=*S. batumense* W.). (Goathland Moor) Bellerby.
f. *laxissimum* W. (N.E. Yorks.) Wheldon.
f. *rufescens* W. (Wheeldale.)
var. *diversifolium* W., f. *squarrosulum* W. (Goathland.)
f. *inundatum* W. (Falling Foss.)
var. *intermedium* W., f. *ovalifolium* W. (Skipwith Com.)
sub-f. *breviramosum* W. (Cronkley pastures and Skipwith Common.)
f. *lanceolatum* W. (Skipwith Common, Wheatley Wood and Hebden Bridge.)
f. *leptocladum* W. (Skipwith Com. and Goathland.)
S. bavaricum W. (Near Fen Bog, Goathland) Bellerby.
S. rufescens W. (Cronkley and Mickle Fells) Jones and Horrell; (S.W. Yorks.) Leyland.
var. *magnifolium* W. (Skipwith Common.)
f. *rufidulum* W. (Wheeldale and Fen Bog.)
sub-f. *densiramosum* W. (Eller Beck.)
f. *albescens* W. (N.W. Yorks.) Wheldon, (Skipwith Common and Eller Beck).
f. *virescens* W. (Warthill.)
f. *fluitans* W. (Skipwith Common.)
var. *parvulum* W., f. *gracile* W. (Fen Bog.)
f. *pulchrum* W. (Skipwith Common; a beautiful Sphagnum and abundantly fruiting.)
f. *canovirescens* W. (N.W. Yorks.) Horrell, (Fen Bog).
S. imbricatum Russ. Rare.
var. *cristatum* W. (Mickle Fell) Jones and Horrell.
f. *congestum* W. (N.W. Yorks.) Wheldon.
var. *affine* W. (*S. imbricatum* v. *laeve* W.) (Mickle Fell) Jones and Horrell, (S.W. Yorks.) Needham, (Gormire) Wheldon, (Arncliffe Wood).
S. papillosum Lindb. Common.
var. *normale* W., f. *majus* Grav., sub-f. *subfuscum* Wheld. (Fen Bog.)
f. *squarrosulum* Ingh. and Wheld., sub-f. *pulcherrimum* Ingh. and Wheld. (Ravenscar.)
f. *brachycladum* W. (Strensall Common.)
sub-f. *pallescens* Wheld. (Strensall Common and Osmotherley.)
sub-f. *flavofuscum* Wheld. (Goathland.)
f. *confertum* W., sub-f. *pallidum* Wheld. (Strensall Com.), (Mid. W. Yorks.) Wheldon.
var. *sublaeve* Limpr. (Mickle Fell) Jones and Horrell.

f. *glaucovirens* Schlieph. (Leckby Carr and Askham Bog.)
f. *breviramosum* W., sub-f. *heterocladum* W. (Castleton Moor), sub-f. *orthocladum* W. (Wheeldale).
f. *compactum* W. (Mid. W. Yorks.) Wheldon.

S. cymbifolium Ehrh. Very common.
var. *glaucescens* W., f. *squarrosulum* Pers. (Near Sheffield) Snelgrove, (N.E. Yorks.) Anderson.
sub-f. *pycnocladum* W. (N.E. Yorks.) Wheldon.
f. *brachycladum* W. (Skipwith Common.)
var. *pallescens* W. (N.E. Yorks.) Anderson, (S.W. Yorks.) Needham, (N.W. Yorks.) Wheldon, (Skipwith Common).
f. *laxum* W. (Saltersgate Beck.)
f. *confertum* Wheld. (Fen Bog.)
var. *flavescens* W. (N.E. Yorks.) Anderson, (N.W. Yorks.) Wheldon, (Skipwith Common).
var. *fuscescens* W. (Cronkley pastures) Jones and Horrell, (Fen Bog).

S. subbicolor Hampe. (Strensall Common) Wheldon.

S. medium Limpr.
var. *flavescens* Russ., f. *brachyanocladum* W. (Cronkley pastures) Jones and Horrell, (Leckby Carr and Farngill).
var. *virescens* W., f. *abbreviatum* W. (Mickle Fell) Jones and Horrell.
var. *roseum* W. (Cronkley Fell and Mickle Fell) Jones and Horrell.
f. *squarrosulum* W. (Mickle Fell) Jones and Horrell.
f. *abbreviatum* W. (N.W. Yorks.) Jones and Horrell.
var. *purpurascens* W. (Mickle Fell) Jones and Horrell (Fen Bog).
var. *versicolor* W. (Cronkley and Mickle Fells) Jones and Horrell (Fen Bog).

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Plant Materials of Decorative Gardening: Woody Plants, by William Trelease. pp. 204, Urbana, 1917. In this little work Prof. Trelease has attempted a very useful task in providing a means of identifying the very miscellaneous garden material now used so largely in Botany Schools. Only the woody plants are here dealt with, but over 1,150 species and forms are described, which may be found in cultivation in the Eastern United States and in Northern Europe. The plants are dealt with first, by means of keys, in four sections viz.,, trees, shrubs, undershrubs and climbers ; then follows a systematic arrangement with keys to the species under each genus. There is a useful glossary and an index. The nomenclature adopted is that of Bailey's ' Standard Cyclopedia of Horticulture.' The British botanist will find many inequalities and omissions, but these are inevitable. Only three species of *Erica* are given, but he includes no fewer than seven forms of *Calluna vulgaris* !

FIELD NOTES.

LEPIDOPTERA.

***Sphinx convolvuli* in the Scarborough District in the Autumn of 1917.**—During the autumn there was an immigration of Convolvulus Hawk Moths in this district. I have seen specimens procured at Scarborough on August 22nd, and on September, 3rd, 10th, 12th, and two others obtained during September, but the exact date of capture is lacking. Also one specimen from Scalby on August 31st.

In connection with the occurrence on September 3rd, an interesting episode happened. I was attending the funeral of an old friend at the Cemetery on that date, and an old lady in the company suddenly made a furious onslaught with her umbrella upon some object in the grass. Presently one of the grave diggers went to her help, and assisted in hammering, with his spade, the object of her attentions. After the funeral was over, I went to the spot to see what they had been killing, expecting to find a frog or toad, but instead I found the battered remains of a Convolvulus Hawk Moth. The gravedigger was standing by contemplating the corpse of the fearful beast, and when I stooped to pick it up, he hastily exclaimed: 'Deaen't touch it, it's a hoss-teng.'* I had some difficulty in persuading the man that the object of his attentions was after all but a harmless moth. This reminds me of a somewhat similar incident which occurred in the autumn of last year. A Death's Head Moth had flown upon the deck of a Scarborough fishing boat while out at sea. The crew viewed the intruder with great dread, and turned the hose on it, washing it into a corner, where half dead, it was transfixed to the deck by a daring member of the crew, armed with a hammer and big wire nail. To make it additionally secure a fish box was turned over it, and so it arrived in port where I saw it shortly afterwards, still alive in spite of its ill usage.—W. J. CLARKE.

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ARCHÆOLOGY.

Prehistoric Remains in Doncaster.—In the November number of *The Naturalist* appears an article by Mr. A. Jordan recording the finding of flint flakes on Doncaster Race Common; the great numbers of worked flakes appear to denote either a much larger early Neolithic population in Yorkshire than is generally admitted, or, which is perhaps more probable, a long period during which these stone implements were being

* Hoss-teng = horse sting, a name often applied to the Dragon fly in Yorkshire.

lost by the users? A friend of the writer's has over 2,000 similar flakes in his possession which have been found during recent years on the moors surrounding Goathland; the separate definite places in which many of these were found clustered together seem to denote a camp or village site. Mr. Jordan also mentions 'strips of land like occupation plots . . . parallel to each other.' These surely are the old English 'furrow-long' acres, 40 poles in length and having an uncultivated space between each, called a 'Balk;' 120 acres were frequently tied together and formed the tillage field in what is known as the three-field system of agriculture. We would recommend to those interested in this subject 'The Village Community,' by the late F. Seebohm, F.R.S., published in 1883. The writer shows that most of our towns have been built upon the sites of earlier settlements; probably in the case of Doncaster, the same sequence of events have been, or can be, traced as suggested by Mr. Jordan at the close of his article. These early men whose roughly chipped flakes were trodden into the earth below their rush-strewn floors, would be followed by more advanced Celtic, and other tribes of whom we knew but little, but whose occupation of the site as rulers was brought to a close by the more advanced civic life to be found within the demesne of the Roman manor; next we should find the Saxon and Scandinavian immigrants settled in the same place, their early English ideals being in course of time subjected to the innovations introduced by Norman overlords. During these changes of ownership dating from Roman, if not from still earlier times, the tillers of the soil had continued to cultivate their land under the three-field system, an agricultural arrangement of scattered holdings that has existed until a comparatively recent date. The subject is of interest, for it is the preservation of knowledge gained from these old time communities, that helps us to link up the history of our country with its geological records.—J. T. Sewell, Whitby, November, 1917.

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The Sixth edition of the *Illustrated Catalogue of the Museum of Fisheries and Shipping*, by T. Sheppard, has just been published (56 pp. 2d.).

The Herbaceous Garden, by **Alice Martineau,** third impression, revised, 1917. London: Williams and Norgate, 298 pp., 7/6 net. Now that a revival seems to have taken place in the interest taken in gardening, and especially herbaceous gardens—which surely appeal to naturalists much more than do the geometrical and bed-quilt patterns—we take this opportunity of drawing attention to still another impression of Mrs. Martineau's well-known book—with its practical advice and wealth of illustration. The present edition has been revised, and there is an Introduction by Mr. W. Robinson. Those contemplating gardening for the first time—and even those who already possess a garden—will do well to invest three half-crowns in this book.

NORTHERN NEWS, etc.

The death is announced of Worthington G. Smith of Dunstable, at the age of 82.

The Huddersfield Technical College is appealing for support to enable it to enlarge the buildings.

Prof. J. E. Marr, F.R.S., has been appointed Woodwardian Professor of Geology, Cambridge, in succession to the late Prof. T. McKenny Hughes.

We are glad to see that a Royal medal has been awarded by the Royal Society to Dr. A. Smith Woodward for his researches in vertebrate palæontology.

We regret to learn that Dr. Eagle Clarke of the Royal Scottish Museum has had the misfortune to meet with an accident which has resulted in the fracture of one of the bones of his right hand.

In *The Entomologist* for November, Dr. J. W. H. Harrison writes on '*Baldratia salicorniæ* (Kieffer) and *Stefaniella brevipalpis* (Kieffer), two Cecidomyidæ New to the British Fauna, with reference to other insects,' based on specimens collected in Durham.

British Birds for November contains an illustrated article on John Hunt (1777-1842), by Capt. H. S. Gladstone. There is also a record on Shags in Cheshire and Lancashire, and a note on 'Newly discovered Irish Colonies of Roseate and Sandwich Terns,' by C. J. Carroll.

A Catalogue of the Borough of Newark Municipal Museum (32 pages, 2d.) has been issued, and contains detailed particulars of over 400 exhibits. An unusual feature is the advertisements, which cannot be torn out, as they are printed on the backs of the pages containing the descriptions.

In the *Proceedings of the Academy of Natural Sciences of Philadelphia* (Vol. LXIX., pt. 1), Mr. S. Berry gives the name *Moschites challengeri* to a cephalopod, taken in 1874, which was described by Dr. W. E. Hoyle in 1886 as *M. virrucosa*. Mr. Berry considers that the specimen is not *virrucosa* but a new species.

The Annual Report of the Scottish Marine Biological Association is to hand, and contains the familiar good record of a year's work, illustrated by reproductions of very fine photographs of various forms of marine life. There is also a useful 'Price List of specimens obtainable from the Marine Station, Millport.'

We have received from Mr. G. W. Lamplugh, F.R.S., a reprint of two interesting papers of his which appear in the *Summary of Progress of the Geological Survey* for 1916. They are entitled 'On a Deep Boring Made in 1907-9 at Battle,' and 'The Underground Range of the Jurassic and Lower Cretaceous Rocks in East Kent.'

After a little sleep *Knowledge* again makes it appearance, No. 582, Jan-Sept. (p. 1-20) being published. The next number has been promised on November 25th. Among the papers are 'Flora Selborniensis,' 'The experimental work of Dr. Bastian on the Origin of Life,' 'Weather Forecasting' and several shorter notes. There are some excellent illustrations.

In a note on 'The Naturalist's Joys,' in *The Selborne Magazine* for November, the Rev. E. A. Woodruffe-Peacock records that he got a nest over fifty years, which he has just identified as that of the Nuthatch. He also once recorded that the Cuckoo 'lays her egg on the ground, takes it up in her bill, and places it in the nest of the small bird she is about to victimise.' He did not know at the time he recorded his observation that it was 'a new thing.'

In *The Entomologist's Monthly Magazine* for November, Mr. E. A. Butler records 'Two Additons to the List of British Hemiptera-Heteroptera,' one of which, *Orthotylus virens*, is from Cumberland. In the same number is a note by Dr. E. Bergroth in which he states 'In the August number of the present volume of this magazine pp. 180-182, Mr. E. A. Butler has published a paper to the effect that the British representative of this genus (*Aphelochirus*) should bear the name *A. montandoni* Horv. I feel sure, however, that it should retain its old name, *aestivalis* Fabr.'

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COMPILED BY W. E. L. WATTAM.

It is not an index in the strictest sense of that term, but it is a classified summary of the contents of the volume, arranged so as to be of assistance to active scientific investigators; the actual titles of papers not always being regarded so much as the essential nature of their contents.

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CORRIGENDA.

Page 43, line 28, *for* " papillose " *substitute* " papillosa."
,, ,, ,, 32, *for* " ampulliger " *substitute* " ampulligera."
,, 87, ,, 2, *for* " W. C. Trevelyn " *read* " Sir W. C. Trevelyan."
,, 347, ,, 13, *for* "varieties" *read* "rarities."
,, ,, bottom line, *for* ,, ,, ,,

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